EPA KEY CONTACTS FORM

OMB Number: 2030-0020
Expiration Date: 06/30/2024

Authorized Representative: *Original awards and amendments will be sent to this individual for review and acceptance, unless otherwise indicated.*

Name: Prefix: Mr. First Name: David Middle Name:
Last Name: Hearne Suffix:

Title: Commissioner, Division of Air Quality

Complete Address:

Street1: Cleveland Division of Air Quality
Street2: 75 Erieview Plaza
City: Cleveland State: OH: Ohio
Zip / Postal Code: 44114 Country: USA: UNITED STATES

Phone Number: (216) 664-2178 **Fax Number:**

E-mail Address: dhearne@clevelandohio.gov

Payee: *Individual authorized to accept payments.*

Name: Prefix: Ms. First Name: Kimberlye Middle Name:
Last Name: Davis Suffix:

Title: Fiscal Manager, Department of Public Health

Complete Address:

Street1: 75 Erieview Plaza
Street2:
City: Cleveland State: OH: Ohio
Zip / Postal Code: 44114 Country: USA: UNITED STATES

Phone Number: (216) 664-4358 **Fax Number:**

E-mail Address: kdavis@clevelandohio.gov

Administrative Contact: *Individual from Sponsored Programs Office to contact concerning administrative matters (i.e., indirect cost rate computation, rebudgeting requests etc).*

Name: Prefix: Mr. First Name: David Middle Name:
Last Name: Hearne Suffix:

Title: Commissioner, Division of Air Quality

Complete Address:

Street1: Cleveland Division of Air Quality, 75 Erieview Plaza
Street2:
City: Cleveland State: OH: Ohio
Zip / Postal Code: 44114 Country: USA: UNITED STATES

Phone Number: (216) 664-2178 **Fax Number:**

E-mail Address: dhearne@clevelandohio.gov

EPA KEY CONTACTS FORM

Project Manager: *Individual responsible for the technical completion of the proposed work.*

Name: Prefix: Ms. First Name: Christina Middle Name:

Last Name: Yoka Suffix:

Title: Chief of Air Pollution Outreach

Complete Address:

Street1: 75 Erieview Plaza

Street2:

City: Cleveland State: OH: Ohio

Zip / Postal Code: 44114 Country: USA: UNITED STATES

Phone Number: 2166642129 **Fax Number:**

E-mail Address: cyoka@clevelandohio.gov

OMB Number: 2030-0020
Expiration Date: 06/30/2024

Preaward Compliance Review Report for All Applicants and Recipients Requesting EPA Financial Assistance

Note: Read Instructions before completing form.

I. A. Applicant/Recipient (Name, Address, City, State, Zip Code)

Name: Cleveland Department of Public Health - Division of Air Qual

Address: 75 Erieview Plaza, 2nd Floor

City: Cleveland

State: OH: Ohio Zip Code: 44114

B. DUNS No. 884644881

II. Is the applicant currently receiving EPA Assistance? ☒ Yes ☐ No

III. List all civil rights lawsuits and administrative complaints pending against the applicant/recipient that allege discrimination based on race, color, national origin, sex, age, or disability. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

Karen Aluma v. City of Cleveland Department of Public Health- Case No. CLEB4 (46295) 03122021 AMENDED
a. Employment related
b. Age, National Origin, and Retaliation
c. Case is pending.

Dreyon Wynn v. City of Cleveland Department of Public Health Case No. 21-EMP-CLE-46010 06302021
a. Employment related
b. Race and retaliation
c. Case is pending.

Stephanie Pike Moore v. City of Cleveland Department of Public Health Case No. CLE74 (45670) 01222020
a. Employment related
b. Race and Retaliation
c. Case is pending.

Teresa Floyd v. City of Cleveland Department of Public Health Case No. CLE A4 (46162) 12232020
a. Employment related
b. Age, Race, Retaliation
c. Case is pending.

Dreyon Wynn v. City of Cleveland Department of Public Health CLE74 (46740) 10202021
a. Employment Related
b. Race/Color, Retaliation, Harassment
c. Case is pending.

Dreyon Wynn v. City of Cleveland Department of Public Health Case No. 20-EMP-CLE-45630 12292020
a. Employment related
b. Retaliation
c. Case is pending

Dreyon Wynn v. City of Cleveland Department of Public Health, Case No. 21-EMP-CLE-45833 05202021
a. Employment Related
b. Race, Retaliation, Forced Resignation, Harassment
c. Case is pending.

Dreyon Wynn v. City of Cleveland Department of Public Health Case No. 21-EMP-CLE-46120 09092021
a. Employment related
b. Race, retaliation
c. Case is pending.

Jeannie Johnson v. City of Cleveland Department of Public Health Case No. 21-EMP-CLE-46035 08302021
a. Employment related
b. Race, Retaliation
c. Case is pending.

Karen Aluma v. City of Cleveland – Case No. 21-EMP-CLE-45678
a. Employment related
b. Retaliation
c. Case is pending.

Karen Aluma v. City of Cleveland Department of Public Health Case No. 21-EMP-CLE-45463
a. Employment related
b. National Origin and Age.
c. Case is pending.

Raafeeq Ali v. City of Cleveland Department of Public Health Case No. CLE74 (46036) 10082020
a. Employment related
b. Race
c. Case is pending.

IV. List all civil rights lawsuits and administrative complaints decided against the applicant/recipient within the last year that allege discrimination based on race, color, national origin, sex, age, or disability and enclose a copy of all decisions. Please describe all corrective actions taken. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

The have been no lawsuits or administrative complaints decided against the Cleveland Department of Pubic Health in the last two years.

V. List all civil rights compliance reviews of the applicant/recipient conducted by any agency within the last two years and enclose a copy of the review and any decisions, orders, or agreements based on the review. Please describe any corrective action taken. (40 C.F.R. § 7.80(c)(3))

There have been no Civil Rights reviews conducted within the last two years

VI. Is the applicant requesting EPA assistance for new construction? If no, proceed to VII; if yes, answer (a) and/or (b) below.

☐ Yes ☒ No

a. If the grant is for new construction, will all new facilities or alterations to existing facilities be designed and constructed to be readily accessible to and usable by persons with disabilities? If yes, proceed to VII; if no, proceed to VI(b).

☐ Yes ☐ No

b. If the grant is for new construction and the new facilities or alterations to existing facilities will not be readily accessible to and usable by persons with disabilities, explain how a regulatory exception (40 C.F.R. 7.70) applies.

VII. Does the applicant/recipient provide initial and continuing notice that it does not discriminate on the basis of race, color, national origin, sex, age, or disability in its program or activities? (40 C.F.R 5.140 and 7.95)	☒ Yes	☐ No
a. Do the methods of notice accommodate those with impaired vision or hearing?	☒ Yes	☐ No
b. Is the notice posted in a prominent place in the applicant's offices or facilities or, for education programs and activities, in appropriate periodicals and other written communications?	☒ Yes	☐ No
c. Does the notice identify a designated civil rights coordinator?	☒ Yes	☐ No
VIII. Does the applicant/recipient maintain demographic data on the race, color, national origin, sex, age, or handicap of the population it serves? (40 C.F.R. 7.85(a))	☒ Yes	☐ No
IX. Does the applicant/recipient have a policy/procedure for providing access to services for persons with limited English proficiency? (40 C.F.R. Part 7, E.O. 13166)	☒ Yes	☐ No

X. If the applicant is an education program or activity, or has 15 or more employees, has it designated an employee to coordinate its compliance with 40 C.F.R. Parts 5 and 7? Provide the name, title, position, mailing address, e-mail address, fax number, and telephone number of the designated coordinator.

CDAQ has 15+ employees & is subject to 40 CFR part 7. Part 7 compliance employees, except for the prosecutor, are located at 601 Lakeside Ave., Cle, OH 44114. Labor & employment: Megan Schenk, Labor Relations Manager, P 2166644284, F 2166643489, mschenk@clevelandohio.gov. EEO for small business & Cle residents: OEO, Michael Curry, Interim Director, P 2166644152, F 2166643870. Federal Consent Decree: Gary Singletary, Chief Counsel 2166642737, 2166642663, gsingletary@clevelandohio.gov. Each non-employment discrimination ordinance identifies the administrator. Cleveland Ordinances, Part 6 -Offenses & Activities Code, Title 5 -Discrimination, prohibits discrimination in employment & areas other than employment. Administration by Community Relations Board & City OEO. Particular ordinances may also be enforced by the City Prosecutor, Aqueelah Jordan, Chief Assist. Prosecutor, Cleveland Prosecutor's Office, 1200 Ontario Street, Cle, OH 44113, P2166644850, F 2166644399 ajordan@cleveland.ohio

XI. If the applicant is an education program or activity, or has 15 or more employees, has it adopted grievance procedures that assure the prompt and fair resolution of complaints that allege a violation of 40 C.F.R. Parts 5 and 7? Provide a legal citation or Internet Address for, or a copy of, the procedures.

The City and CDAQ have 15 or more employees. They have grievance procedures that assure the prompt and fair resolution of complaints that allege a violation of 40 CFR Part 7. Since the City and CDAQ are not an educational institution 40 CFR Part 5 is not applicable. They have specific grievance procedures for each of their collective bargaining units in each collective bargaining unit. The non-collective bargaining unit procedures are provided by the EEOC. All of the following procedures are available at the following Internet Address:
https://www.clevelandohio.gov/CityofCleveland/Home/Government/CityAgencies/Hu manResources/HR_Publications?field_category_forms_pubs_tid=All&title=&cck_mul tiple_field_remove_fields&page=1

For the Applicant/Recipient

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law. I assure that I will fully comply with all applicable civil rights statutes and EPA regulations.

A. Signature of Authorized Official	B. Title of Authorized Official	C. Date
Christina Yoka	Chief of Air Pollution Outreach	03/25/2022

For the U.S. Environmental Protection Agency

I have reviewed the information provided by the applicant/recipient and hereby certify that the applicant/recipient has submitted all preaward compliance information required by 40 C.F.R. Parts 5 and 7; that based on the information submitted, this application satisfies the preaward provisions of 40 C.F.R. Parts 5 and 7; and that the applicant has given assurance that it will fully comply with all applicable civil rights statures and EPA regulations.

A. *Signature of Authorized EPA Official	B. Title of Authorized Official	C. Date

*** See Instructions**

Instructions for EPA FORM 4700-4 (Rev. 06/2014)

General. Recipients of Federal financial assistance from the U.S. Environmental Protection Agency must comply with the following statutes and regulations.
Title VI of the Civil Rights Acts of 1964 provides that no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. The Act goes on to explain that the statute shall not be construed to authorize action with respect to any employment practice of any employer, employment agency, or labor organization (except where the primary objective of the Federal financial assistance is to provide employment). Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act provides that no person in the United States shall on the ground of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under the Federal Water Pollution Control Act, as amended. Employment discrimination on the basis of sex is prohibited in all such programs or activities. Section 504 of the Rehabilitation Act of 1973 provides that no otherwise qualified individual with a disability in the United States shall solely by reason of disability be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. Employment discrimination on the basis of disability is prohibited in all such programs or activities. The Age Discrimination Act of 1975 provides that no person on the basis of age shall be excluded from participation under any program or activity receiving Federal financial assistance. Employment discrimination is not covered. Age discrimination in employment is prohibited by the Age Discrimination in Employment Act administered by the Equal Employment Opportunity Commission. Title IX of the Education Amendments of 1972 provides that no person in the United States on the basis of sex shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance. Employment discrimination on the basis of sex is prohibited in all such education programs or activities. Note: an education program or activity is not limited to only those conducted by a formal institution. 40 C.F.R. Part 5 implements Title IX of the Education Amendments of 1972. 40 C.F.R. Part 7 implements Title VI of the Civil Rights Act of 1964, Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act, and Section 504 of The Rehabilitation Act of 1973. The Executive Order 13166 (E.O. 13166) entitled; "Improving Access to Services for Persons with Limited English Proficiency" requires Federal agencies work to ensure that recipients of Federal financial assistance provide meaningful access to their LEP applicants and beneficiaries.

Items "Applicant" means any entity that files an application or unsolicited proposal or otherwise requests EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Recipient" means any entity, other than applicant, which will actually receive EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Civil rights lawsuits and administrative complaints" means any lawsuit or administrative complaint alleging discrimination on the basis of race, color, national origin, sex, age, or disability pending or decided against the applicant and/or entity which actually benefits from the grant, but excluding employment complaints not covered by 40 C.F.R. Parts 5 and 7. For example, if a city is the named applicant but the grant will actually benefit the Department of Sewage, civil rights lawsuits involving both the city and the Department of Sewage should be listed. "Civil rights compliance review" means any review assessing the applicant's and/or recipient's compliance with laws prohibiting discrimination on the basis of race, color, national origin, sex, age, or disability. Submit this form with the original and required copies of applications, requests for extensions, requests for increase of funds, etc. Updates of information are all that are required after the initial application submission. If any item is not relevant to the project for which assistance is requested, write "NA" for "Not Applicable." In the event applicant is uncertain about how to answer any questions, EPA program officials should be contacted for clarification. * Note: Signature appears in the Approval Section of the EPA Comprehensive Administrative Review For Grants/Cooperative Agreements & Continuation/Supplemental Awards form.

Other Attachment File(s)

*** Mandatory Other Attachment Filename:** 1235-Quality Assurance and Quality Control Stateme

Add Mandatory Other Attachment | Delete Mandatory Other Attachment | View Mandatory Other Attachment

To add more "Other Attachment" attachments, please use the attachment buttons below.

Add Optional Other Attachment | Delete Optional Other Attachment | View Optional Other Attachment

Project Narrative File(s)

*** Mandatory Project Narrative File Filename:** 1234-CLEANinCLE_final_3.25.22.pdf

Add Mandatory Project Narrative File | Delete Mandatory Project Narrative File | View Mandatory Project Narrative File

To add more Project Narrative File attachments, please use the attachment buttons below.

Add Optional Project Narrative File | Delete Optional Project Narrative File | View Optional Project Narrative File

BUDGET INFORMATION - Non-Construction Programs

OMB Number: 4040-0006
Expiration Date: 02/28/2022

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act	66.034	$	$	$ 500,000.00	$ 221,358.00	$ 721,358.00
2.						
3.						
4.						
5. Totals		$	$	$ 500,000.00	$ 221,358.00	$ 721,358.00

Standard Form 424A (Rev. 7- 97)
Prescribed by OMB (Circular A -102) Page 1

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY				Total
	(1)	(2)	(3)	(4)	(5)
	Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act				
a. Personnel	$ 61,707.00	$	$	$	$ 61,707.00
b. Fringe Benefits	18,768.00				18,768.00
c. Travel					
d. Equipment	118,141.00				118,141.00
e. Supplies	39,880.00				39,880.00
f. Contractual					
g. Construction					
h. Other	261,504.00				261,504.00
i. Total Direct Charges (sum of 6a-6h)	500,000.00				$ 500,000.00
j. Indirect Charges					$
k. TOTALS (sum of 6i and 6j)	$ 500,000.00	$	$	$	$ 500,000.00
7. Program Income	$	$	$	$	$

Authorized for Local Reproduction

Standard Form 424A (Rev. 7- 97)
Prescribed by OMB (Circular A -102) Page 1A

SECTION C - NON-FEDERAL RESOURCES

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e)TOTALS
8. Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act	$ 221,358.00	$	$	$ 221,358.00
9.				
10.				
11.				
12. TOTAL (sum of lines 8-11)	$ 221,358.00	$	$	$ 221,358.00

SECTION D - FORECASTED CASH NEEDS

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$ 294,629.00	$ 34,552.00	$ 72,832.00	$ 152,693.00	$ 34,552.00
14. Non-Federal	$ 109,316.00	18,829.00	18,829.00	52,829.00	18,829.00
15. TOTAL (sum of lines 13 and 14)	$ 403,945.00	$ 53,381.00	$ 91,661.00	$ 205,522.00	$ 53,381.00

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT

(a) Grant Program	FUTURE FUNDING PERIODS (YEARS) (b)First	(c) Second	(d) Third	(e) Fourth
16. Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act	$ 294,629.00	$ 102,685.00	$ 102,685.00	$
17.				
18.				
19.				
20. TOTAL (sum of lines 16 - 19)	$ 294,629.00	$ 102,685.00	$ 102,685.00	$

SECTION F - OTHER BUDGET INFORMATION

21. Direct Charges:

22. Indirect Charges:

23. Remarks:

Authorized for Local Reproduction

OMB Number: 4040-0004
Expiration Date: 12/31/2022

Application for Federal Assistance SF-424

* 1. Type of Submission:
- [x] Preapplication
- [ ] Application
- [ ] Changed/Corrected Application

* 2. Type of Application:
- [x] New
- [ ] Continuation
- [ ] Revision

* If Revision, select appropriate letter(s):

* Other (Specify):

* 3. Date Received: 03/25/2022

4. Applicant Identifier:

5a. Federal Entity Identifier:

5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:

7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name: Cleveland Department of Public Health

* b. Employer/Taxpayer Identification Number (EIN/TIN): 34-6000646

* c. Organizational DUNS: 8846448810000

d. Address:

* Street1: 75 Erieview Plaza Floor 2
Street2: 75 Erieview
* City: Cleveland
County/Parish:
* State: OH: Ohio
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 44114-1839

e. Organizational Unit:

Department Name: Department of Public Health

Division Name: Division of Air Quality

f. Name and contact information of person to be contacted on matters involving this application:

Prefix: Ms.
* First Name: Christina
Middle Name: Lynn
* Last Name: Yoka
Suffix:

Title: Chief of Air Pollution Outreach

Organizational Affiliation:

* Telephone Number: (216) 664-2129
Fax Number:

* Email: cyoka@clevelandohio.gov

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

C: City or Township Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Environmental Protection Agency

11. Catalog of Federal Domestic Assistance Number:

66.034

CFDA Title:

Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act

*** 12. Funding Opportunity Number:**

EPA-OAR-OAQPS-22-01

* Title:

Enhanced Air Quality Monitoring for Communities

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Community Leveraged Expanded Air Network in Cleveland (CLEANinCLE) Project

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: 11 * b. Program/Project: OH-11

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 10/01/2022 * b. End Date: 09/30/2025

18. Estimated Funding ($):

* a. Federal	500,000.00
* b. Applicant	221,358.00
* c. State	0.00
* d. Local	0.00
* e. Other	0.00
* f. Program Income	0.00
* g. TOTAL	721,358.00

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on .

☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☒ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

Add Attachment | Delete Attachment | View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: Ms. * First Name: Christina

Middle Name: Lynn

* Last Name: Yoka

Suffix:

* Title: Chief of Air Pollution Outreach

* Telephone Number: 2166642129 Fax Number:

* Email: cyoka@city.cleveland.oh.us

* Signature of Authorized Representative: Christina Yoka * Date Signed: 03/25/2022

Better Health Partnership
Collaborating for a healthy community

March 9, 2022

David Hearne
Commissioner, Division of Air Quality
Cleveland Department of Public Health
75 Erieview Plaza, 2nd Floor
Cleveland, OH 44114

Dear Commissioner Hearne:

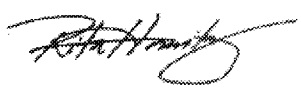
It is with great enthusiasm that Better Health Partnership (BHP) provides this letter of support for Cleveland Division of Air Quality's (CDAQ) proposal. This project will expand Cuyahoga County's ambient air monitoring network into communities that are experiencing adverse health outcomes that are typically associated with air pollution exposure, such as respiratory and cardiovascular disease. CDAQ will use a Federal Equivalent Method (FEM) particulate matter monitor and a network of low cost air quality sensors to better understand the air pollution exposure rates within these communities. CDAQ will also include a series of residential interviews that will help CDAQ understand the community's perception of localized air quality and their health is impacted. The expanded monitoring network will service communities that experience environmental justice concerns as evidenced by diagnosed health data, proximity and density of known air pollution sources, resident demographics, and communities that exceed the 85th percentile in various air pollution categories of the EPA EJ Screen Tool. The FEM monitor will be housed in a mobile shelter, which will enable this project to extend beyond the three-year project period of the Enhanced Air Quality Monitoring for Communities funding opportunity available under RFA Number: EPA-OAR-OAPQS-22-01.

Founded in 2007, BHP is a regional health care improvement collaborative that works collectively with health care and other sectors to advance data-informed improvements in adult, child, and infant/maternal health, while also reducing health disparities. As partners on this project, BHP offers support in providing aggregated benchmark data on specific clinical metrics for children across Northeast Ohio as well as specific targeted neighborhoods. Examples include the following topics:

- Asthma diagnoses
- Asthma exacerbations (inpatient and ambulatory)
- Clinical practices dealing with asthma (e.g., asthma plans, controller medications, education, etc.)

Thank you for the opportunity to partner with you and for leading this innovative initiative.

Sincerely,



Rita Horwitz, President and CEO
Better Health Partnership

CASE WESTERN RESERVE UNIVERSITY
INSTITUTE FOR SMART, SECURE AND CONNECTED SYSTEMS

Institute for Smart, Secure and Connected Systems (ISSACS)
Business Address: 11111 Euclid Avenue
Cleveland, OH 44106
Phone 216.368.1809

March 15, 2022

David Hearne
Commissioner, Division of Air Quality
Cleveland Department of Public Health
75 Erieview Plaza, 2nd Floor
Cleveland, OH 44114

SUBJECT: Letter of Commitment - Enhanced Air Quality Monitoring for Communities
PROJECT TITLE: Community Leveraged Expanded Air Network in Cleveland (CLEANinCle)
RFA NUMBER: EPA-OAR-OAPQS-22-01

Dear Commissioner Hearne:

This Letter of Commitment from Case Western Reserve University is for the Cleveland Division of Air Quality's (CDAQ) proposal titled **"Community Leveraged Expanded Air Network in Cleveland (CLEANinCle)"** to the Enhanced Air Quality Monitoring for Communities funding opportunity available under RFA Number: EPA-OAR-OAPQS-22-01. The CLEANinCle project will expand Cuyahoga County's ambient air monitoring network into communities that are experiencing adverse health outcomes associated with air pollution exposure, such as respiratory and cardiovascular disease. CDAQ will use a Federal Equivalent Method (FEM) particulate matter monitor and a network of low cost air quality sensors to better understand the air pollution exposure rates within these communities. CLEANinCle will also include a series of residential interviews that will help CDAQ understand the community's perception of localized air quality and how their health is impacted. The expanded monitoring network will service communities that experience environmental justice concerns as evidenced by diagnosed health data, proximity and density of known air pollution sources, resident demographics, and communities that exceed the 85th percentile in various air pollution categories of the EPA EJ Screen Tool. The FEM monitor will be housed in a mobile shelter, which will enable this project to extend beyond the three-year project period of the funding opportunity.

CASE WESTERN RESERVE UNIVERSITY
INSTITUTE FOR SMART, SECURE AND CONNECTED SYSTEMS

Institute for Smart, Secure and Connected Systems (ISSACS)
Business Address: 11111 Euclid Avenue
Cleveland, OH 44106
Phone 216.368.1809

Case Western Reserve University's efforts will be a joint effort between the Department of Population and Quantitative Health Sciences (PQHS) in our School of Medicine and the Institute for Smart, Secure and Connected Systems (ISSACS).

The Department of Population and Quantitative Health Sciences at Case Western Reserve University School of Medicine will provide all support, data manipulation, storage and analysis of the spatial video geonarrative (SVG) data being collected by CDPH. PQHS will provide the tools required to conduct the SVG interviews such as the audiovisual recording devices, and the software to transcribe the interviews. PQHS will train CDPH staff on how to conduct the SVG interviews and transcribe the data. These spatial videos, narratives and transcriptions will be processed, corrected and used as a data source to understand various aspects of perceived neighborhood air quality. Results will be shared with the rest of the team during monthly conference calls, and through conference presentations and journal publications. At the end of each year of effort the department will provide a report of activities and achievements.

The ISSACS team will build the necessary processes and software to support approximately 30 LoRaWAN air quality sensors deployed to the LoRaWAN network around Cleveland, Ohio managed by the Cleveland Water Alliance. The documentation and technical deliverables provided will aid in the provisioning of sensors and the operation of the data pipeline to collect, store and visualize the sensor data on a publicly available dashboard. The FEM and AEM data from CDPH's EPA monitoring sites will also be included in the data visualization. ISSACS efforts are expected to primarily take place in year 1 with limited effort in years 2 and 3.

The total costs of these efforts are as follows:

Department of Population and Quantitative Health Sciences	$63,211
Institute for Smart, Secure and Connected Systems	$99,736
Total	**$162,947**

CASE WESTERN RESERVE UNIVERSITY | INSTITUTE FOR SMART, SECURE AND CONNECTED SYSTEMS

Institute for Smart, Secure and Connected Systems (ISSACS)
Business Address: 11111 Euclid Avenue
Cleveland, OH 44106
Phone 216.368.1809

Case Western Reserve University believes that CLEANinCle will help our constituents in the following ways:

- Provide experiential learning opportunities for two undergraduate students to build their technical and soft skills on a public sector project
- The data collected by the deployed sensors will provide Case Western Reserve University schools and programs valuable insights into how environmental conditions correlate with a community's health and socioeconomic status.

Case Western Reserve University fully supports the goals of the CLEANinCle project. We look forward to working with the Cleveland Division of Air Quality efforts to improve health outcomes for City of Cleveland residents by expanding the region's air quality network. Please contact me at nab2@case.edu with any questions.

Sincerely,

Nicholas Barendt

Nicholas Barendt
Executive Director, Institute for Smart, Secure and Connected Systems (ISSACS)

Name	Title
Maeve Georgia MacMurdo	MBChB/MPH

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
University of Otago School of Medicine (Dunedin, New Zealand)	MBChB	2014	Medicine
Providence St. Vincent Medical Center (Portland, OR)		2018	Internal Medicine Residency
Oregon Health Sciences University (Portland, OR)		2018	Fellowship in Clinical Education/Research
Cleveland Clinic (Cleveland, OH)		2021	Pulmonary/Critical Care Medicine
Case Western Reserve University	MPH	2022	Public Health/Spatial Epidemiology

PERSONAL STATEMENT

Throughout my residency and fellowship training, I have focused on understanding the impact of environment and exposure on pulmonary health. As a pulmonary fellow during the early EVALI epidemic, I had the opportunity to build my skills both as a researcher characterizing this novel exposure, and as an advocate for policy level change through local community outreach and collaboration with the American Thoracic Society. I continued to work to understand the impact of exposure on disease outcomes, and obtained internal grant funding which supported my research into the impact of substance misuse on outcomes for patients with asthma. This funding resulted in two first author publications, and my selection as a research track fellow, which provided funding to pursue my Masters in Public Health with a focus on geospatial epidemiology concurrently with my fellowship training.

Following fellowship, I joined the Cleveland Clinic as junior research faculty, with a clinical focus on occupational and environmental lung disease. I believe that the health of an individual is impacted not only by exposure, but by the broader environment in which they live and work. Conversely, when researching the environment, the experience of the environment by the individual also provides important insight- both in terms of disease risk, and in guiding interventions that can improve health. My work with the Tulare County Department of Health and Human Services identified high risk exposures to ambient air pollution among individuals experiencing homelessness within the county, and provided a framework for the methodology proposed in this application.[12] Expanding on my earlier research in the association between novel environmental exposures and lung disease, I have been awarded internal funding to investigate the impact of residential pesticide exposure on the risk of progressive fibrotic lung disease utilizing satellite derived land-use data.

Since graduating fellowship I have worked to build the geospatial epidemiology interest group within my department, and have been selected to present an American Thoracic Society 'meet the experts' session in collaboration with NASA focused on applications of GIS and satellite data in health and policy research. My primary research goal is to utilize patient centered research approaches in combination with traditional spatial methodologies to better understand the interaction between individual, exposure and environment, and to decrease disparities in exposure associated pulmonary disease.

POSITIONS AND HONORS:

- Resident- Providence St Vincent Medical Center (2015-2018)
- Research Fellow- Oregon Health Sciences University (2018)
- Pulmonary/Critical Care Medicine Fellow, Cleveland Clinic Respiratory Institute (2018- 2021)
- Clinical Associate, Cleveland Clinic Respiratory Institute (2021- present)

Professional committees:

- American Thoracic Society Environmental, Occupational and Population Health Assembly (2018-present)
- American Thoracic Society Environmental, Occupational and Population Health Planning Committee (2021-present)
- American Thoracic Society Tobacco Policy Task Force Subgroup chair (2020- present)

Honors/awards:

- Dean's commendation for Clinical Excellence in Medicine, University of Otago, 2013, 2014
- Award for contribution to excellence in medical education, University of Otago, 2014
- Resident of the year, Providence St. Vincent Medical Center, Portland, OR, 2016
- Fellow of the month, Cleveland Clinic Internal Medicine residency program, 2019
- Teaching excellence award, Cleveland Clinic Learner College of Medicine, 2020

CONTRIBUTIONS TO SCIENCE

The harmful effects of exposure to air pollution at a population level are increasingly well recognized. The impact of air pollution exposure at a local level, particularly among vulnerable population's remains poorly understood. Working in collaboration with the Tulare County Board of Public Health, we developed novel techniques to better understand exposure to air pollution among individuals experiencing unsheltered chronic homelessness at the local level, highlighting both the high levels of ambient air pollution experienced by this population, and providing support for housing first policy interventions within the county.

1. MacMurdo MG. Mulloy K. Felix C. Curtis A. Ajayakumar J. Curtis J. Ambient air pollution exposure among individuals experiencing unsheltered homelessness. Environmental Health Perspectives. EPUB ahead of print
2. MacMurdo MG. Mulloy K. Culver, D. Felix C. Curtis A. Ajayakumar J. Curtis J. Utilizing satellite derived estimates of PM2.5 to quantify exposure to ambient air pollution among individuals experiencing unsheltered homelessness. Journal of Health and Place. In review.

Asthma continues to be a major driver of morbidity and mortality for patients within the United States. Comorbidities, including substance and alcohol misuse, may contribute to worsening asthma outcomes. Through an internally funded grant, I utilized large healthcare databases to explore the secondary comorbidity associated with substance and alcohol misuse in patients with obstructive lung disease. We found that co-occurring alcohol and substance misuse were associated with a significant increase in healthcare costs, and an increased risk of readmission in patients with chronic obstructive asthma phenotypes.

1. MacMurdo MG. Lopez R. Udeh B. Zein J. Beyond tobacco- the secondary impact of substance misuse in chronic obstructive lung disease. Journal of Asthma. 2020 DOI: 10.1080/02770903.2020.1847932
2. MacMurdo MG. Lopez R. Udeh B. Zein J. Alcohol use disorder and healthcare utilization in patients with chronic asthma and obstructive lung disease. Alcohol. Epub 2021 Mar 10.

SELECTED PUBLICATIONS: *List, in chronological order, the titles and complete references to recent representative publications, especially those most pertinent to this application.*

Complete Bibliography: https://www.ncbi.nlm.nih.gov/myncbi/maeve.macmurdo.1/bibliography/public/

Cleveland Clinic

Maeve MacMurdo, MD
Department of Pulmonary Medicine

David Hearne
Commissioner, Division of Air Quality
Cleveland Department of Public Health
75 Erieview Plaza, 2nd Floor
Cleveland, OH 44114

Dear Commissioner Hearne:

As lung physicians with interests in airway disease as well as occupational and environmental lung disease within the Cleveland Clinic Respiratory Institute, we would like to submit this Letter of Support for Cleveland Division of Air Quality's (CDAQ) Community Leveraged Expanded Air Network in Cleveland (CLEANinCLE). The CLEANinCLE project will expand Cuyahoga County's ambient air monitoring network into communities that are experiencing adverse health outcomes that are typically associated with air pollution exposure, such as respiratory and cardiovascular disease. CDAQ will use a Federal Equivalent Method (FEM) particulate matter monitor and a network of low cost air quality sensors to better understand the air pollution exposure rates within these communities. CLEANinCLE will also include a series of residential interviews that will help CDAQ understand the community's perception of localized air quality and their health is impacted. The expanded monitoring network will allow public health experts to monitor and service communities that experience environmental justice concerns as evidenced by diagnosed health data, proximity and density of known air pollution sources, resident demographics, and communities that exceed the 85th percentile in various air pollution categories of the EPA EJ Screen Tool. The FEM monitor will be housed in a mobile shelter, which will enable this project to extend beyond the three-year project period of the Enhanced Air Quality Monitoring for Communities funding opportunity available under RFA Number: EPA-OAR-OAPQS-22-01.

Dr. MacMurdo is a recognized expert in occupational and environmental lung disease. Her research focuses on combining qualitative and quantitative spatial epidemiology approaches to investigate the impact of environment on health. She has committed to support CLEANinCLE as an expert advisor on the harmful health effects of air pollution. In this role, she will meet regularly with the CLEANinCLE team to provide input on the data collected, and guidance about how best to utilize these findings to improve the health of communities impacted by air pollution.

There is a drastic need for improved ambient air monitoring within Cleveland, particularly within communities that already bear a high burden of historic and current disparities, including respiratory disease. Exposure to air pollution has been shown to increase the frequency of asthma exacerbations, and is increasingly associated with an increased risk of negative outcomes in diseases such as idiopathic pulmonary fibrosis and chronic obstructive lung disease. It is vitally important that more refined and localized air quality patterns and trends be assessed.

As clinicians, data that quantifies air pollution levels within our community will allow us to better counsel our patients, reducing the risk of exacerbations and improving health related quality of life. This will also help them self-actualize and advocate for their health. Not only as clinicians, but as researchers who have specialized in ambient air pollution and airways disease

The Cleveland Clinic Foundation
Pulmonary, Allergy and
Critical Care Medicine

9500 Euclid Avenue / A90
Cleveland, Ohio 44195

Tel: 216 445-5763
Fax: 216 445-8160
dweikr@ccf.org

as well as occupational lung and overall disease, we know that the data provided by these additional monitors will allow us to better understand disparities in air pollution within Cleveland, and support further research exploring ambient and occupational air pollution exposures. Additionally, the insight provided by the community interviews included within CLEANinCLE will provide important groundwork for further research into novel methodologies for assessing the impact of air pollution exposure by communities.
We heartily and fully support the goals of the CLEANinCLE. We look forward to working with the Cleveland Division of Air Quality efforts to improve health outcomes for City of Cleveland residents by expanding the region's air quality network. Please contact me at (216-633-5863/macmurm@ccf.org) with any questions.

Sincerely,

Dr. Maeve Georgia MacMurdo (MBChB, MPH)
Director, Occupational Lung Disease Center
Cleveland Clinic Respiratory Institute

Dr. Sumita Bhattacharya Khatri, MD MS
Professor of Medicine and Director, Asthma Center
Vice Chair of Respiratory Institute

Cleveland Clinic Occupational Lung Disease Clinic

The Cleveland Clinic Foundation
Pulmonary, Allergy and
Critical Care Medicine

9500 Euclid Avenue / A90
Cleveland, Ohio 44195

Tel: 216 445-5763
Fax: 216 445-8160
dweikr@ccf.org

NAME: CURTIS, ANDREW

POSITION TITLE & INSTITUTION: Professor, Case Western Reserve University

A. PROFESSIONAL PREPARATION - (see PAPPG Chapter II.C.2.f.(i)(a))

INSTITUTION	LOCATION	MAJOR/AREA OF STUDY	DEGREE (if applicable)	YEAR (YYYY)
State University of New York, Buffalo	Buffalo	Geography	Ph.D.	1995
State University of New York, Buffalo	Buffalo	Geography	MA	1991
Oxford University, U.K.	Oxford	Geography	PGCE	1988
Portsmouth Polytechnic, U.K.	Portsmouth	Geography & Economics	BA (Hons)	1987

B. APPOINTMENTS -

From - To	Position Title, Organization and Location
2019-present	Professor, Department of Population and Quantitative Health Sciences, Case Western Reserve University School of Medicine
2015-2019	Professor, Department of Geography, Kent State University
2012-2015	Associate Professor, Department of Geography, Kent State University
2007-2012	Associate Professor, (Geography then American Studies) University of Southern California 2001-2007
2001-2007	Assistant Professor, Department of Geography and Anthropology, Louisiana State University
1999-2001	Instructor, Department of Geography and Anthropology, Louisiana State University
1996-1999	Assistant Professor, Department of Geography, Government and History, Morehead State University
1995-1996	Instructor, Department of Geography, Government and History, Morehead State University

C. PRODUCTS - Products Most Closely Related to the Proposed Project

Curtis A., Ajayakumar J., Curtis J., Mihalik S., Purohit M., Scott J., Muisyo J., Labadorf J., Vijitakula S., Yax J., Goldberg D., (2020) Geographic monitoring for early disease detection (GeoMEDD) Nature Scientific Reports 10 (1) 1-11

Ajayakumar, J., Curtis, A., and Jacqueline Curtis (2019) Addressing the data guardian and geospatial scientist collaborator dilemma: how to share health records for spatial analysis while maintaining patient confidentiality International Journal of Health Geographics 18 (1) 1-12

Curtis, A., J.W. Curtis, J. Ajayakumar, E. Jefferis, and S. Mitchell. (2019) Same Space - Different Perspectives: comparative analysis of geographic context through sketch maps and spatial video geonarratives. International Journal of Geographical Information Science. 33(6) 1224-1250

Curtis, A., Curtis, J.W., Porter, L.C., Jefferis, E., and Eric Shook (2016) Context and spatial nuance inside a neighborhood's drug hotspot: implications for the crime-health nexus Annals of the Association of American Geographers 106(4): 819-836

Curtis, A., Mills, J.W., and M. Leitner (2006) Spatial confidentiality and GIS: re-engineering mortality locations from published maps about Hurricane Katrina International Journal of Health Geographics 5:44.

Other Significant Products, Whether or Not Related to the Proposed Project

Curtis, A.; Squires, R.; Rouzier, V.; Pape, J.W.; Ajayakumar, J.; Bempah, S.; Taifur Alam, M.; Alam, M.M.; Rashid, M.H.; Ali, A.; Morris, Jr, J.G. (2019) Micro-Space Complexity and Context in the Space-Time Variation in Enteric Disease Risk for Three Informal Settlements of Port au Prince, Haiti. Int. J. Environ. Res. Public Health 16, 807

Curtis, A., Felix, C., Mitchell, S. and P. Kerndt (2018) Contextualizing Overdoses in Los Angeles' Skid Row between 2014 and 2016 by Leveraging the Spatial Knowledge of the Marginalized Annals of the Association of American Geographers 108 (6) 1521-1536

Jacquez, G. M., A. Essex, A. Curtis, B. Kohler, R. Sherman, K. El Emam, C. Shi, A. Kaufmann, L. Beale, T. Cusick, D. Goldberg and P. Goovaerts (2017). "Geospatial cryptography: enabling researchers to access private, spatially referenced, human subjects data for cancer control and prevention." Journal of Geographical Systems 19 (3): 197-220

Curtis, Andrew, Jacqueline W. Curtis, Eric Shook, Steve Smith, Eric Jefferis, Lauren Porter, Laura Schuch, Chaz Felix, and Peter R. Kerndt. (2015) Spatial video geonarratives and health: case studies in post-disaster recovery, crime, mosquito control and tuberculosis in the homeless. International Journal of Health Geographics 14 (1), 22. PMCID: PMC4528811

Curtis, A., Mills, J.W., L. Augustin and M. Cockburn (2011) Confidentiality Risks in Fine Scale Aggregations of Health Data Computers, Environment and Urban Systems 35 57-64

D. SYNERGISTIC ACTIVITIES -

2021 – now Provide geospatial analysis to the Ohio Department of Health and Ohio Hospital Association collaborative response to COVID-19

2020—now Provide geospatial support for the Cleveland Department of Public Health's mapping of COVID-19

2020 – now Provide geospatial support for the UH and Cleveland Clinic combined regional COVID-19 response

2004-07 Director, World Health Organization Collaborating Center for Remote Sensing and GIS for Public Health

2005 Provide Geospatial support for the Search and Rescue Operations in the Louisiana Emergency Operation Center for Hurricanes Katrina and Rita 2005

Quality Assurance (QA) and Quality Control (QC):

Through the Community Leveraged Expanded Air Network Project (CLEANinCLE) Cleveland Division of Air Quality (CDAQ) will be monitoring for Particulate Matter (PM) PM2.5 and PM10 with a continuous Federal Equivalency Method (FEM) monitor and a number of air quality sensors. CDAQ will also monitor for ozone utilizing an Automated Equivalent Method analyzer. The plan is to operate a Teledyne T640x as the FEM monitor, iaconnects LoRa Outdoor Air Quality Sensor (LoRa Sensor) as the air quality sensors, and a Teledyne T400 as the ozone analyzer. Data evaluation for this project will adhere to established comprehensive CDAQ data review processes which ensures all ambient air monitoring data collected is correctly recorded and processed.

David Salem, QA/QC Coordinator and Monitoring Field Manager is responsible for the review of all ambient air monitoring data collected by the Ohio EPA monitors located throughout Cuyahoga County and will additionally evaluate the data generated by this project. Mr. Salem has over 7 years of experience at this position.

The CDAQ review process evaluates whether data meet established specifications in federal regulations, quality assurance project plans, instrument operating procedures, data objectives and additionally incorporates various techniques requiring questioning and informed judgement critical to the determination of the quality of environmental data.

To summarize: review of the project monitoring data will initially be conducted via daily review of a data acquisition system polling methods to determine if results are complete and compare to expected values. Any suspect information will be documented, investigated and corrective action processes initiated if warranted. Scheduled visitations of selected monitoring locations will be conducted periodically by a site operator to ensure physical verification of the operation. Field visitation includes observing physical site conditions, weather related incidents, instrument condition/diagnostics and manual QC evaluations.

Measurement quality objectives outlined within the USEPA QA II Handbook, Appendix D criteria will be observed, performed and recorded by the site operator. All data requiring invalidation or qualification will be flagged appropriately using AQS defined null/qualifier codes. Monthly data sets will be reviewed for suspicious data values including for example, short term hourly spikes, extended periods of consistent data, multiple occurrences of zero particulate concentrations. Data comparability from similar monitors within the monitoring network may additionally be conducted. Secondary data including site temperature, QC Checks, corrective action reports, verification/calibration results and instrument logbooks will be thoroughly reviewed to ensure monitoring operations are maintained within expected criteria. Each month the CDAQ will review the previous month data and include a shortfall documentation form to be saved along with the data file.

The primary objective for this project is to produce high quality technically sound, defensible environmental data that meets regulatory requirements.

Teledyne T640x and Teledyne Ozone Analyzer Quality Assurance and Quality Control Plan:

CDAQ has operated continuous PM monitors for over 20 years and has operated Teledyne T640/T640x monitors since 2018. CDAQ currently operates two Teledyne T640x and one Teledyne T640. CDAQ has multiple staff trained in the operation and maintenance of the Teledyne T640x. CDAQ maintains National Institute of Standards and Technology (NIST) certified flow, temperature, and pressure instruments for QC checks.

CDAQ has extensive experience operating ozone analyzers. CDAQ currently operates 3 seasonal ozone and 1 year round ozone site. CDAQ has multiple staff trained in the operation and maintenance of Teledyne Ozone Analyzers. CDAQ maintains several certified level 3 ozone transfer standards for QC checks.

CDAQ will utilize Agilaire Air Vision Software to securely store, manage and validate data. Data generated from the analyzers will be displayed on a data dashboard for the community to access in near real-time.

CDAQ will meet or exceed the Critical and Operational Criteria required by the QA Handbook. Wherever possible CDAQ will follow the Systematic Criteria outlined in the QA Handbook. CDAQ will also utilize the existing Ohio EPA Standard Operating Procedures (SOPs) for Continuous Particulate Matter Sampling and Ozone Sampling.

Independent quality assurance practices are implemented to assess the systematic bias of monitoring data. Ohio EPA is the primary quality assurance agency for the Ohio Ambient Monitoring Network and conducts Annual PE / Semi-Annual flow rate verification auditing throughout the network. Ohio EPA will perform Semi-Annual flow rate audits of the T640x and annual performance evaluations of the ozone analyzer throughout the grant period

Iaconnects LoRa Outdoor Air Quality Sensor Quality Assurance and Quality Control Plan:

CDAQ has experience deploying various types of air quality sensors. CDAQ has deployed PurpleAir and Tetrad Air U air sensors. CDAQ was part of a group that was awarded a National Science Foundation (NSF) grant to install fifty Tetrad AirU air sensors to study the relationship of Covid-19 outcomes and ambient PM 2.5 concentrations. Two of the sensors were collocated with existing Ohio EPA continuous FEM samplers. For the project CDAQ contributed by generating a siting checklist and siting criteria for the sensors. CDAQ also assisted in developing correction factors for the sensors.

CDAQ will install LoRa Sensor's throughout the Cleveland Crescent. CDAQ will collocate a LoRa Sensor with the trailer mounted T640x and with an existing Ohio EPA T640x. CDAQ will utilize USEPA's "Excel-based Marcro Analysis Tool for Air Sensor Data" to evaluate the data. CDAQ will also follow recommended practices outlined in USEPA's "Instruction Guide: How to Evaluate Low-Cost Sensors by Collocation with Federal Reference Monitors". CDAQ will utilize many of the guides available as part of the Air Sensor Toolbox including but not limited to "A Guide to Siting and Installing Air Sensors", "Air Sensor Guidebook", and "Sensor Collocation Guide". Sensor PM2.5 will be displayed on a data dashboard for the community to access in near real-time.

CDAQ will review data on a daily and monthly basis to determine if there are sensor issues. If there are abnormal readings CDAQ will investigate to determine if readings are valid.

Christina Yoka, Chief of Air Pollution Outreach
Cleveland Department of Public Health – Division of Air Quality
75 Erieview Plaza, Suite 200
Cleveland, OH 44114

O: 216-664-2129 F: 216-420-8047
cyoka@city.cleveland.oh.us

Christina Yoka is the Chief of Air Pollution Outreach for the Cleveland Department of Public Health – Division of Air Quality (CDAQ). Ms. Yoka and her team respond to neighborhood level air quality concerns through technical analysis and community education. She is responsible for air quality outreach program direction, engaging stakeholders, and overseeing certain air pollution regulatory actions at Cleveland facilities. Since joining CDAQ in February 2018, Ms. Yoka has led the development of community air monitoring initiatives that engage organizations, local researchers, and youth. Ms. Yoka and the Outreach team deliver project based learning experiences for youth utilizing air sensors to learn about conducting high quality citizen science research.

As a project partner on the National Science Foundation funded Tetrad air sensor deployment project, Ms. Yoka adopted curriculum from the University of Utah Air Sensor Lego Lesson workshop plans. This workshop is an opportunity for youth to build air sensors utilizing Lego's and various sensor component pieces. She piloted the workshop at Cleveland's Great Lakes Science Center in the summer of 2021. Since the initial pilot, she has led the workshop with youth groups, at Cleveland Public Schools, and at local private schools. The Lego workshop is held either as a single one-time engagement, or it is held as a part of a series of classroom interactions in which students learn about environmental justice, local air quality concerns, developing citizen science projects, and data collection/evaluation. Ms. Yoka will present "Engaging Youth and the Community in Citizen Science with Air Sensors" at the Air Sensor International Conference on May 13, 2022, in Pasadena, California.

Ms. Yoka was the Clean Transportation Program Director at Earth Day Coalition, a U.S. Department of Energy Clean Cities Coalition, from 2014 – 2018. She assisted organizations with vehicle fleets in exploring alternative fuel options that would meet their operational needs. She served as the local primary investigator on multiple federal awards for reducing emissions in the transportation sector such as the Midwest EVOLVE (Electric Vehicle Opportunities: Learning, Events and Experience) multistate partnership. In 2017, Ms. Yoka led the Reducing Greenhouse Gas Emissions through Alternative Fuels project that convened regional fleets in a series of workshops; introduced educators to career pathways in this field; and produced three educational videos documenting career pathways. From 2010 – 2014, Ms. Yoka was the Special Events and Marketing Coordinator at Earth Day Coalition.

Ms. Yoka has a B.A. in Comparative Religious Studies and a B.S. in Environmental Sciences from Cleveland State University. She also earned an M.A. in Zoology from Miami University (OH) through the Advanced Inquiry Program.

Ohio Environmental Protection Agency

Mike DeWine, Governor
Jon Husted, Lt. Governor
Laurie A. Stevenson, Director

March 17, 2022

David Hearne
Commissioner, Division of Air Quality
Cleveland Department of Public Health
75 Erieview Plaza, 2nd Floor
Cleveland, OH 44114

Dear Commissioner Hearne:

On behalf of Ohio EPA, please accept this Letter of Commitment as confirmation of our participation in Cleveland Division of Air Quality's (CDAQ) Enhanced Air Monitoring Project.

The Enhanced Air Monitoring Project will expand Cuyahoga County's ambient air monitoring network into communities that are experiencing adverse health outcomes that are typically associated with air pollution exposure, such as respiratory and cardiovascular disease. CDAQ will use a Federal Equivalent Method (FEM) particulate matter monitor and a network of low cost air quality sensors to better understand the air pollution exposure rates within these communities.

The Enhanced Air Monitoring Project will also include a series of residential interviews that will help CDAQ understand the community's perception of localized air quality and their health is impacted. The expanded monitoring network will service communities that experience environmental justice concerns as evidenced by diagnosed health data, proximity and density of known air pollution sources, resident demographics, and communities that exceed the 85th percentile in various air pollution categories of the EPA EJ Screen Tool. The FEM monitor will be housed in a mobile shelter, which will enable this project to extend beyond the three-year project period of the Enhanced Air Quality Monitoring for Communities funding opportunity available under RFA Number: EPA-OAR-OAPQS-22-01.

The Ohio EPA Division of Air Pollution Control (DAPC) commits to ensuring success of the Enhanced Air Monitoring Project by:

1. Ohio EPA DAPC will perform semi-annual flow rate audits as required by the QA Handbook Volume II, Appendix D, for the Teledyne T640x in the trailer-mounted shelter. Audits will be performed for a period of 2 years.
2. Ohio EPA DAPC will perform an annual audit as required by the QA Handbook Volume II, Appendix D, for the ozone monitor in the trailer-mounted shelter. Audits will be performed for a period of 2 years.
3. Ohio EPA DAPC will assist CDAQ in accessing the States' Air Vision Software. If needed, will supply CDAQ with an Ohio EPA modem to transmit data from an Agilaire

Data-Logger. CDAQ will utilize Air Vision to handle data that is generated from the trailer-mounted monitoring site.

4. Ohio EPA DAPC will allow CDAQ access to data from Ohio EPA monitoring sites to display on the air quality data dashboard. Ohio EPA monitoring data can then be layered with sensor data.

Ohio EPA is not requesting any compensation for our assistance under CDAQ's Enhanced Air Monitoring Project.

Ohio EPA fully supports the goals of the Enhanced Air Monitoring Project. We look forward to working with the Cleveland Division of Air Quality efforts to improve health outcomes for City of Cleveland residents by expanding the region's air quality network. Please contact me at (614-644-3585) with any questions.

Sincerely,

Robert Hodanbosi

Robert F. Hodanbosi P.E.
Chief, Division of Air Pollution Control, Ohio EPA

Cleveland
Neighborhood
Progress

Mr. David Hearne
Commissioner, Division of Air Quality
Cleveland Department of Public Health
75 Erieview Plaza, 2nd Floor
Cleveland, OH 44114

Dear Commissioner Hearne:

It is my pleasure to provide support to the City of Cleveland's Division of Air Quality's (CDAQ) Community Leveraged Expanded Air Monitoring in Cleveland (CLEANinCLE) plan through the funding opportunity available under RFA Number: EPA-OAR-OAPQS-22-01 over the next three years. This project will expand Cuyahoga County's ambient air monitoring network into communities that are experiencing adverse health outcomes that are typically associated with air pollution exposure, such as respiratory and cardiovascular disease. The expanded monitoring network will service communities that experience environmental justice concerns as evidenced by diagnosed health data, proximity and density of known air pollution sources, resident demographics, and communities that exceed the 85th percentile in various air pollution categories of the EPA EJ Screen Tool.

Creating a feedback loop around qualitative and quantitative feedback with the community is a critical part of understanding and responding to the local air quality Additionally, for long, residents in neighborhoods have been excluded from participating in decisions that influence their environments and their understanding of it Community Leveraged Expanded Air Monitoring in Cleveland (CLEANinCLE) plan will include a series of residential interviews in 3 participating neighborhoods, that will help CDAQ understand the community's perception of localized air quality and their health is impacted.

Cleveland Neighborhood Progress is a local community development funding intermediary with over thirty years of experience investing in community revitalization work in Greater Cleveland. Neighborhood Progress was founded in 1988 and serves a unique function as the only local intermediary in the region, working primarily to provide service to our neighborhoods through our network of community development organizations. Our mission is to foster inclusive communities of choice and opportunity throughout Cleveland, and our vision is one where Cleveland's neighborhoods are attractive, vibrant, and inclusive communities where together, people from diverse incomes, races, and generations thrive, prosper, and choose to live, learn, work, and invest. In 2016, CNP launched a timed Climate Ambassador program to learn about climate and environmental impacts affecting the quality of life of Cleveland residents. CNP works with residents and policy makers to prioritize the community and environmental health in the face of climate change.

CNP is committed to providing both community engagement and logistical support to this project to help build out the baseline for current air quality as experienced by the residents and as observed by community organizations

through their work in the neighborhoods. This engagement will also provide community feedback to the proposed air quality dashboard to ensure accessibility and usefulness. To this end, in addition to being an active thought partner for the overall project, CNP will perform the following, but not limited to:

1. Manage the six (6) member Resident Advisory Committee for Air Quality:
    - Develop selection and formation process for the six (6) member Resident Advisory Committee for Air Quality from across the three identified neighborhoods;
    - Provide administrative support to process and manage the contracts and payments for the members of the Resident Advisory Committee for Air Quality;
    - Connect the Resident Advisory Committee for Air Quality members with the participating CDCs and other community partners as needed;
    - Support the Resident Advisory Committee with any additional support to perform their tasks related to sharing information from their community to the project team and to the residents.

2. Provide Logistical Support for Virtual and In-Person Public Forums in the three neighborhoods over a three-year term:
    - Coordinate venue for the in-person public events based on then current safety protocols;
    - Ensure accessibility to participation by facilitating childcare and language access;
    - Provide communication and outreach support for the public forums;
    - Facilitate and ensure proper note taking in partnership with Neighborhood Connection to ensure feedback mechanism;

3. Facilitating connections between project partners with participating neighborhood's organization and partners.

The value of the aforementioned services, including stipends to the six (6) members of the Resident Advisory Committee for Air Quality is $72,635. Residents of Cleveland have been engaged in environmental issues, particularly raising concerns around their ambient air quality and this project expand the monitoring of air quality to both examine policy changes to improve air quality and to identify mechanisms to deliver better health outcomes. It is impossible to overstate our support and excitement around the process to proposes to lean into their lived and learned experiences to expand the region's air quality monitoring network to address ambient air quality experienced by residents, and the positive impacts of new policies stemming this project.

Sincerely,

Tania Menesse
President & Chief Executive Officer

Community Leveraged Expanded Air Network in Cleveland (CLEANinCLE)

Project Description: The CLEANinCLE project will expand Cleveland's air monitoring network into historically redlined Cleveland neighborhoods that are still experiencing negative health outcomes. Community members will participate in the meaningful design of an expanded air monitoring network through public forums, the establishment of a resident advisory committee, and through a series of residential interviews. The outputs and outcomes will take the form of public engagement with marginalized communities, expanded air monitoring networks informed by the community, increased data/access, and public health interventions.

Pollutant Scope: Particulate Matter2.5, Particulate Matter 10, and ozone

Project Period: 10/1/2022 – September 30, 2025

Project Location: The CLEANinCLE project will cover an area in the Cleveland community that is locally referred to as the "Cleveland Crescent." The neighborhoods that are in the Cleveland Crescent represent the historically redlined communities that still present with poor health outcomes including diabetes, hypertension, and pediatric asthma. This region represents approximately 48% of Cleveland residents.

Budget Summary

EPA Funding Request	Total Project Cost
$500,000	$721,358

Organizational Description: Cleveland Department of Public Health (CDPH) – Division of Air Quality is the lead applicant on the CLEANinCLE proposal. CDPH is a local health agency accredited through the Public Health Accreditation Board. The Division of Air Quality (CDAQ) is the Environmental Protection Agency delegated local air agency serving Cuyahoga County. CDAQ is responsible for the operation of an ambient air monitoring network for criteria air pollutants in Cuyahoga County and enforcement of all State/Federal air pollution control rules and regulations.

Primary Contact:
Christina Yoka
Chief of Air Pollution Outreach/Project Manager
(216) 664-2129 |
cyoka@clevelandohio.gov

Address:
Cleveland Division of Air Quality
75 Erieview Plaza, 2nd Floor
Cleveland, OH 44114

DUNS Number:
884644881

Project Partners:
Better Health Partnership, Dr. Christopher Mundorf
Case Western Reserve University
Department of Population and Quantitative Health, Dr. Andrew Curtis
Institute for Smart, Secure and Connected Cities, Nick Barendt
Cleveland Clinic Foundation – Respiratory Institute, Dr. Maeve MacMurdo
Cleveland Neighborhood Progress, Divya Sridhar
Ohio Environmental Protection Agency, Robert Hodanbosi

Section One(A): Overall Project Activities

Cleveland Division of Air Quality (CDAQ) will expand Cleveland's ambient air monitoring network in neighborhoods that are experiencing adverse health outcomes due to air pollution exposure. The Community Leveraged Expanded Air Network in Cleveland (CLEANinCLE) project will focus on historically redlined communities. The historical racist practice has a modern day impact on the health of City of Cleveland (CoC) residents in a series of neighborhoods often referred to locally as the Cleveland Crescent. These communities present with poorer health outcomes, including diabetes, hypertension and pediatric asthma,[1] and have been disproportionately impacted by COVID-19. This region represents approximately 99 census tracts and almost 48% of the CoC residents.

The expanded air monitoring network will include a Federal Equivalent Method (FEM) particulate matter monitor, an Automated Equivalent Method (AEM) ozone analyzer, and a network of low cost air quality sensors (sensors) to better understand the air pollution exposure rates within the Cleveland Crescent. The expanded monitoring network will service communities that experience environmental justice concerns as evidenced by diagnosed health data, proximity and density of known air pollution sources, resident demographics, and communities that exceed the 85th percentile in air pollution categories in the EPA Environmental Justice (EJ) Screen Tool. Specific site selection will be determined by public forums, residential interviews, and through a Resident Advisory Committee. The qualitative and quantitative data obtained in this project will be used to inform local medical providers on the barriers residents are experiencing to asthma management, which will enable the development of neighborhood specific communications to asthma management. We expect the results from this project to make dramatic steps towards improving health outcomes in this underserved area of the city.

One (1FEM) monitor will be purchased and deployed and one (1) Teledyne (AEM) ozone analyzer will be deployed. CDAQ will purchase and deploy a continuous FEM monitor for fine (PM 2.5) and coarse (PM 10) particulate matter such as the Teledyne T640x (or equivalent model). CDAQ will deploy a continuous AEM ozone analyzer such as a Teledyne T400 (or equivalent model). The monitoring site will also collect meteorological data including temperature, humidity, wind speed, and wind direction. The FEM monitor and ozone analyzer will be housed in a temperature controlled mobile monitoring shelter (MMS), which is mounted to a trailer. There will be two monitoring sites selected for this project period. The MMS will be sited for up to one-year at each location to allow for seasonal data collection. General location will be determined by respiratory health data, social vulnerability, and a lack of coverage by the existing EPA monitoring network. Within neighborhood placement will be informed by community feedback from resident interviews, the Resident Advisory Committee, and public forums. Monitor data will be collected through an onsite data logger and will be managed through Ohio Environmental Protection Agency's (OEPA) Air-Vision software. This data will be transmitted to a Software as a Service (SaaS) interface data visualization website that will provide the public with near real-time access to outputs. The MMS will be designed to allow for additional air pollution monitors and analyzers to be added at a later time

CDAQ will purchase thirty low cost air quality sensors to deploy into neighborhoods within the Cleveland Crescent. The sensors will collect data on PM2.5, PM10, temperature, and humidity and will use a Long Range Wide Area Network (LoRaWAN) to transmit data. The LoRaWAN's communication technology allows for a single gateway device to wirelessly communicate with multiple sensors. This allows the use of battery-powered sensors rather than mainline power, simplifying deployment. As a result, broad geographic coverage can be achieved with reduced deployment and operations costs. The sensor type will be an iaconnects SEN558 or equivalent model. The data will be transmitted to a cloud service provider for storage and visualization. This will allow for near-real time public access to all data generated from the sensors. One of the sensors will be collocated with the FEM monitor in the MMS, another sensor will be collocated with an existing EPA FEM

[1] https://experience.arcgis.com/experience/22c7182a162d45788dd52a2362f8ed65 from https://www.cdc.gov/places. Accessed 3/11/2022.

monitor for purposes of validation.

Seventeen (17) resident narratives will be collected and mapped. CDAQ will conduct a series of resident interviews to gain a better understanding of the community's perceptions of air quality and how their health is impacted utilizing Spatial Video Narrative(SVG) techniques[2]. SVGs record the reflections and insights of an individual as they move through a landscape as a "go-along" interview. This structure provides an opportunity to gain insights into the lived experience of neighborhood residents, that can be examined both thematically and spatially. Memories and informed interpretation of events are triggered by the surrounding environment. These comments are captured along with a spatially encoded video recording. Project collaborators have previously utilized SVG to explore the lived experience of Cleveland pediatric asthma patients.

A Resident Advisory Committee will be established comprised of six (6) residents that will be engaged in all aspects of the project throughout the full award period. The Advisory Committee will consist of community members who represent critical neighborhoods within the Cleveland Crescent. The Committee will be established through an application process that is managed by project partner Cleveland Neighborhood Progress. The Resident Advisor's role will be to communicate community level concerns, provide guidance on sensor locations, share [3]information about the project with their community members, and encourage community participation in public forums. The resident will receive a stipend for their contribution.

CDAQ will coordinate nine (9) public forums per year of the project and three (3) virtual sessions CDAQ will host a series of community in-person meetings and virtual meetings throughout the project period. The in-person meetings will rotate between targeted neighborhoods within the Cleveland Crescent. Residents will be encouraged to share their lived experiences, identify potential areas of concern, and provide feedback on project decision points. Some of the key decision points that will be addressed include sensor placement locations, data interpretation of collected information, data visualization prototypes, and draft language for community specific health and air quality messaging. The decision points will be presented to the Resident Advisory Committee in advance of the community meetings.

CDAQ will work with 100 medical providers within the Cleveland Crescent to collect information on the barriers to asthma treatment with their patients. Providers will be surveyed on current asthma education practices, and barriers to treatment access. Results will be analyzed by Better Health Partnership to identify common themes, and reviewed during public forums for additional community input. CDAQ will report the results back to Better Health Partnership, who will then work with the participating practices to develop quality improvement processes to modify provider behavior. A follow-up survey will be conducted at the end of the study to determine changes in how providers deliver asthma related services. Additionally, clinical metrics from partnering practices will be able to identify changes at a patient level. This would include asthma diagnoses, usage of asthma plans, asthma controller medications, and asthma exacerbations

Section One(B): Project Significance

The City of Cleveland (CoC) has dealt with long-term effects of structural inequities, compounding a multitude of inequalities, of which the most damaging is systemic racism. The identified social determinants of health leading to inequities in the Cleveland community are lack of economic stability, access to quality education, access to affordable high-quality healthcare, social and community context, and environmental injustice. Located in Cuyahoga County (Northeast Ohio), Cleveland's population is just over 396,000 with nearly 60% identifying as African American, Latino, Native American or Asian and other Pacific Islanders[3]. The Cleveland Crescent is comprised of the communities that were historically designated as either "Hazardous/Grade D" or "Declining/Grade C" according to the Home Owners Loan Corporation (HOLC) map, commonly referred to as redlining. In addition to the Crescent, there is a Cleveland neighborhood to the southwest referred to as the Near-Westside that follows the same social and health inequity patterns. All future references to the Cleveland

---

[2] Curtis, A., J.W. Curtis, J. Ajayakumar, E. Jefferis, and S. Mitchell. (2019) Same Space - Different Perspectives: comparative analysis of geographic context through sketch maps and spatial video geonarratives. **International Journal of Geographical Information Science** 33 (6), 1224-1250

[3] https://www.census.gov/quickfacts/clevelandcityohio. Accessed 3/23/2022

Crescent will include the Near-Westside communities that exhibit the same patterns of inequity. Figure 1 documents the intersection in the Cleveland Crescent of the historic redlining map, current percent African American and percent Hispanic Populations, the current Social Vulnerability Index, and Diagnosed Pediatric Asthma Rates per 1,000 children. Diagnosed pediatric asthma diagnosis rates data was obtained from a data sharing agreement between Better Health Partnership and a network of local medical providers. The existing particulate matter monitoring network is also represented on each map by concentric circles (brown = continuous; purple = intermittent). The smallest circle in the ring is equal to 500 meters and the largest circle is equal to 2,000 meters. Those identifying as African American currently comprise 85% of the population in the "Hazardous" redlined areas and 68-84% of the population in areas that were "Declining" neighborhoods. Individuals identifying as Hispanic are currently up to 56% of the population in the Near-West side location. As an illustration of how this area we intend to target continually suffers from being "left behind", residents in the Cleveland Crescent experienced disproportionate impacts of the COVID-19 pandemic with 59% of hospitalizations (as compared to 41% in all Cleveland) and about 49% of deaths from COVID-19 (Figure 2).

Exposure to PM2.5 is one risk factor that is commonly associated with higher rates of asthma diagnosis and asthma exacerbations, and its ongoing impact in the Crescent have had generational impacts on local residents. Utilizing land use regression techniques, Khatri et al investigated the impact of estimated air pollution exposure on rates of pediatric asthma emergency room visits across Cuyahoga County in 2010. Among children residing in Cleveland, residential PM2.5 and nitrogen dioxide exposure was associated with a significantly increased risk of pediatric asthma exacerbations. Subsequent speciation of particulate matter found that steel mill associated PM2.5 and traffic related air pollution were associated with the highest exacerbation risk[4]. Again, within this study, highest rates of risk were seen in the Cleveland Crescent area. Importantly, while high rates of asthma exacerbations were seen in children residing within the crescent, exposure to PM2.5 concentrations within this sample were estimated utilizing land use regression techniques. Given the scarcity of stationary monitor data in this neighborhood, actual lived exposure to PM2.5 in this cohort may be significantly higher. To further illustrate the need for the CLEANinCLE project, in a recent analysis conducted by Hane et al, nitrogen dioxide and particulate matter concentrations from 2010 monitoring data were compared in communities that were designated as an "A" or "D" rating according to the redlining policy. The research demonstrated that communities with a D rating consistently had higher levels of air pollution. The correlation was stronger for nitrogen dioxide rates then it was for particulate matter.[5]

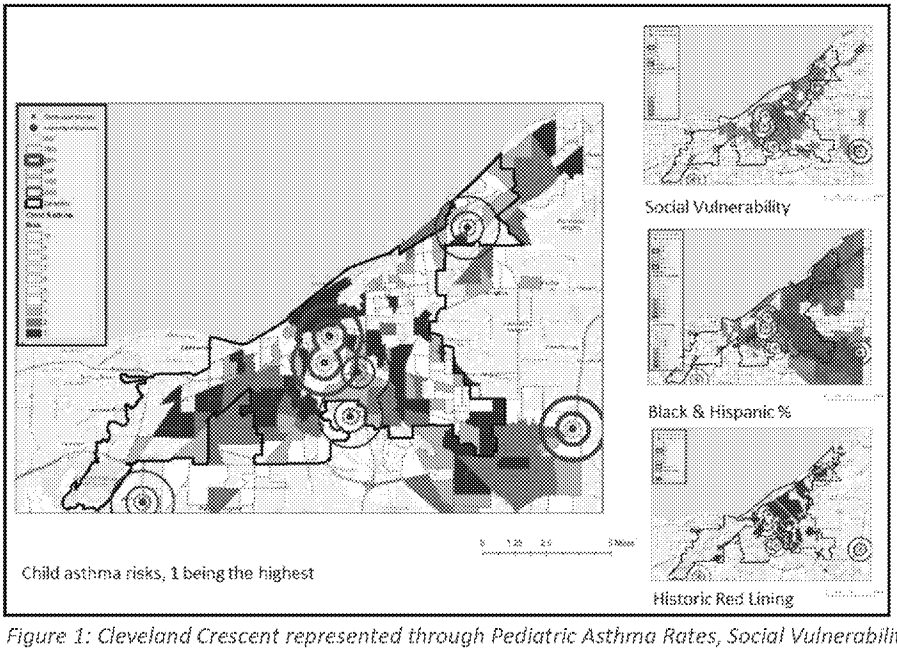


Figure 1: Cleveland Crescent represented through Pediatric Asthma Rates, Social Vulnerability, % Minority, and Historic Redlining. Maps developed at CWRU GIS Health & Hazards Lab. All maps generated at the Case Western Reserve University GIS Health and Hazards Lab

[4]Khatri SB, Newman C, Hammel JP, Dey T, Van Laere JJ, Ross KA, Rose JA, Anderson T, Mukerjee S, Smith L, Landis MS, Holstein A, Norris GA. Associations of Air Pollution and Pediatric Asthma in Cleveland, Ohio. ScientificWorldJournal. 2021 Sep 15;2021:8881390. doi: 10.1155/2021/8881390. PMID: 34566522; PMCID: PMC8460381.

[5] *Environ. Sci. Technol. Lett.* 2022, XXXX, XXX, XXX-XXX. Publication Date: March 9, 2022. https://doi.org/10.1021/acs.estlett.1c01012

In the City of Cleveland, residents are exposed to ambient particulate matter through a variety of industrial sources and mobile emissions. As demonstrated in Figure 1, there are currently three continuous monitors within Cuyahoga County and four intermittent monitoring sites. There are two continuous ozone analyzers. Cuyahoga County is compliant with the current NAAQS Standard for PM2.5, but is in moderate non-attainment for ozone. The City of Cleveland is 212 km^2. The spatial scale of two of the continuous PM monitors is .5km – 2 km and the spatial scale of the third monitor is 100 meters. Clearly even though the City is compliant with the NAAQS PM Standard, many of the most vulnerable neighborhoods are not adequately monitored.

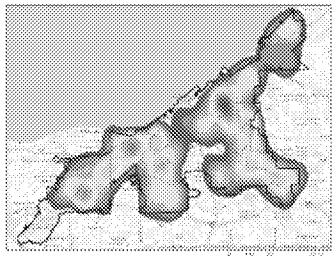


Figure 2: COVID-19 Mortality Rates as Kernel Density Estimation. Data obtained from Cleveland Department

The CLEANinCLE project will investigate the impact of air pollution on the health of CoC residents within the Cleveland Crescent, with a focus on pediatric asthma. Expanding the CoC ambient air monitoring network will enhance community understanding of neighborhood level air pollution, helping residents to reduce their own exposures to PM2.5. The additional federally approved FEM monitor will demonstrate, the degree to which the particulate matter levels agree or disagree with CDAQ's existing monitoring network. The low cost air sensors will provide additional data at the neighborhood scale for communities within the Cleveland Crescent. Since the public will direct and inform the placement of these sensors, CDAQ will be able to capture data that is representative of community knowledge and neighborhood-level concerns. This project will further benefit residents that are more susceptible the impacts of air pollution by developing management strategies, reflecting specific community needs. Medical providers will have access to the quantitative data and narratives which will be used to develop targeted communications and intervention strategies for asthmatic patients. Lastly, all data produced will better equip CDAQ to address environmental concerns within the community.

Section 2(A): Community Partnerships

CDAQ is the lead applicant on the CLEANinCLE project and will be the Project Manager. CDAQ will purchase, deploy, oversee operation/maintenance, and troubleshooting of all equipment. CDAQ will be responsible for quality assurance/quality control measures, interpretation and dissemination of collected data, and community messaging. CDAQ will oversee all aspects of the grant management, administration and reporting requirements.

CLEANinCLE project partners have established and successful relationships in collaborating on air quality, sensor deployment community engagement, and community health activities. CDAQ collaborated with Case Western Reserve University's (CWRU) Institute for Smart, Secure and Connected Cities (ISSACs) and Cleveland Neighborhood Progress (CNP) on a National Science Foundation funded project to deploy 50 battery operated, wi-fi enabled air sensors to neighborhoods in Cuyahoga County. The purpose of the project was to identify potential correlations between particulate matter exposure and instances of COVID-19 diagnosis. This project demonstrated that a major barrier to sensor deployment was access to wireless internet and power. This work informed the use of LoRaWan sensors in this proposal[6]. The EPA EJ Screen Tool demonstrates that Cleveland Crescent communities tend to exceed the 80th percentile in Broadband Gaps, which would be prohibitive in sensor deployment.

Cleveland Neighborhood Progress (CNP)

CNP is a local community development funding and capacity intermediary with 30 years of experience investing in community revitalization work in Greater Cleveland. CNP will serve as the administrative manager for the Resident Advisory Committee and will oversee logistical coordination of the public forums. CNP will secure support services that reduce barriers to public participation at the Neighborhood Forums including childcare, translators, and transcribers. CNP will be responsible for administering stipends and managing other

---

[6] Loparo K., Barendt N., Yoka C. "Increasing our Understanding of PM2.5 Particulate Pollution Monitoring Through a Network of Low-Cost Air Quality Monitors." Swetland Center for Environmental Health Virtual Seminar Series. 3/22/2022.

administrative processes for the members of the Resident Advisory Board. Between 2016-19, CNP developed and managed the Climate Ambassador Program in which resident leaders stewarded neighborhood level implementation of the climate resiliency projects, and informed the 2018 update to Cleveland's Climate Action Plan[7]. This ground up approach has enabled CNP to understand the impacts of poor environmental quality exacerbated by climate change, and to represent community voices in decision making through an intersectional lens. CNP led efforts to explore establishing an Environmental Justice and Cumulative Impact Ordinance (EJ-CIO). CDAQ participated in a 2020 peer learning exchange opportunity coordinated by CNP to visit the Ironbound Community Corporation in Newark, NJ and learn about their EJ-CIO ordinance. CNP, CDAQ and additional local stakeholders have been working to identify opportunities to implement a similar ordinance locally. CNP has also been involved in discussions around updating the City of Cleveland Air Pollution Control Ordinances that were adopted in 1977. Data and feedback gained from the SVG interviews, neighborhood forums, and Resident Advisory Committee may be used to inform the adoption of an EJ-CIO ordinance or updates to the City of Cleveland Air Pollution Code.

Case Western Reserve University (CWRU)

Case Western Reserve University's role will be a joint effort between the Institute for Smart, Secure and Connected Cities (ISSACS) and the Population and Quantitative Health Sciences Department (PQHS) GIS Health & Hazards Lab (GHH) in the School of Medicine (SOM). CWRU launched the Institute for Smart, Secure and Connected Systems (ISSACS) in the spring of 2016 with a focus on activities on the Industrial Internet of Things (IIoT). ISSACS partners with faculty, students and staff across the university's schools to include experts in engineering, anthropology, sociology, mathematics, management, medicine, nursing, law and ethics. ISSACS works with on-campus and off-campus partners to advance research, education, and economic development in Greater Cleveland. ISSACS will provide technical support for all components of the LoRaWAN sensors including setting up the iaconnects sensors to deploy to a LoRaWan network, developing a data storage mechanism, and creating data visualization. ISSACS faculty and staff have over a half a century of combined experience in building, deploying and managing data collection networks for a wide range of uses. ISSACS provides deep experience in the data sensing, collection, storage, analysis and visualization pipelines that leverage embedded devices, cloud services and Low Power Wide Area Networks (LPWAN) including LoRaWAN.

PQHS integrates health research across multiple geographic scales, from the genome to the community, with a focus on improving the quality of life for individuals, communities, and populations. This breadth of research is seen in the various sub-disciplines, including (but not limited to) population health scientists, health data scientists, biostatisticians, cancer and genetic epidemiologists. Collaborations extend to major hospital systems in northeast Ohio, and many county and city public health departments. PQHS also has an extensive research record of working within neighborhood areas and with community groups. The GHH team created the spatial video geonarrative (SVG) methodology to capture on-the-ground community perspectives that will be used in this project. This approach, which utilizes software designed by GHH, has been applied across Ohio, the United States, and even globally to create contextual maps of granular environments at risk. The collaboration between CDPH and GHH is well established as they continue to support the health department in their Cleveland Covid-19 response. For this proposal, GHH will oversee all SVG data collection and analysis, as well as providing geospatial support for the other project components. Insights gained from these SVG maps, and from the project as a whole, will be disseminated through the academic and local communities served by GGH.

Better Health Partnership (BHP)

Founded in 2007, Better Health Partnership is a regional health improvement collaborative that works collectively with health care and other sectors to advance data-informed improvements in adult, child, and

[7] Cleveland Climate Action Plan 2018 Update: Building Thriving and Resilient Neighborhoods for All." Accessed from https://www.sustainablecieveland.org/climate_action on 3/23/2022.

infant/maternal health, while also reducing health disparities. BHP collects individual-level data from health care organizations across Northeast Ohio. BHP aggregates this data and works with public partners to communicate health prevalence in the community. This project will help the BHP health care members better identify barriers to support children with asthma and help develop improved care for them. CDAQ is currently collaborating with Better Health Partnership (BHP) to develop a referral service for individuals diagnosed with asthma to CDAQ's Indoor Air Quality program. This service will offer in-home assessments and education for individuals diagnosed with asthma. CDAQ has served on the BHP Health Metrics Advisory Committee (HMAC) since 2019, in which pediatric asthma has been identified as a major concern. The need to develop this program has been informed by CDAQ's partnership with BHP as well as community feedback received through various engagement activities.

Ohio EPA Division of Air Pollution Control

Ohio EPA will serve as an external agency performing quality assurance activities on the FEM and AEM equipment in the MMS. They will also provide access to data that is generated at CDAQ's monitoring sites and allow that data to be added to a real-time map. CDAQ has been the delegated local air agency for Ohio EPA since 1972.

Cleveland Clinic Respiratory Institute

Cleveland Clinic's Respiratory Institute (CCF RI) provides world-class patient care by combining strengths in clinical care, research and education. With more than 170 pulmonologists, allergists/immunologists, infectious disease experts and critical care specialists, CCF RI serves more than 7000 patients with a diagnosis of asthma yearly. A member of the CCF RI team will serve as an expert advisor on in the impacts of air pollution on health. They will participate in stakeholder meetings, review collected data, and provide insight how the data can be used to improve health outcomes

Section 2(B) Community Engagement

Community members will have the opportunity for meaningful participation in the design and implementation of the CLEANinCLE project through representation on an Advisory Committee, public forums, and residential interviews. CNP will manage the Resident Advisory Committee including selection, stipend and contractual management, and communications throughout the project period. The Advisory Board will be comprised of six residents from targeted communities in the Cleveland Crescent. The role of the Board will be to advise on community needs, inform project direction, suggest neighborhood locations to site sensors, and raise community concerns. The Committee will serve as a liaison between the project partners and community members, communicating regular project updates. The residents will participate in quarterly project partner meetings as well public forums. The expected time commitment is 64-hours per year, including quarterly stakeholder meetings, participation in public forums, training, and independent outreach to community members.

Public Forums will be held on a regular basis (nine in person meetings per year and three virtual sessions). In order to reduce barriers to public participation, childcare and translation services will be provided. Public Forums will be an opportunity for information exchange between residents and project partners. CDAQ will share project updates, draft communications, proposed sensor locations, and insights gained from the SVGs. Meeting notes will be made available after the community meetings through a variety of variety of social media and outreach channels allowing for wider dissemination to those unable to attend

CDAQ will build on existing relationships with local school districts and youth organizations to deliver air pollution, air sensor and citizen science educational programming. During the ISSAC's sensor deployment project, CDAQ piloted an Air Sensor Lego Workshop Cleveland's Great Lakes Science Center. A modified curriculum, of the original developed by the University of Utah[8], was used by CDAQ to lead summer camp youth through the building of air sensors utilizing kits fabricated by CWRU. This highly regarded workshop has since

[8] https://airu.coe.utah.edu/teaching-modules/. Accessed 3/23/2022.

been repeated at Cleveland public and private schools, and with local youth groups, further solidifying the role of CDAQ in local communities. This success will further evolve through this project, as workshops will be offered at the same types of educational institutions by CDAQ but also expanding to include Environmental Justice, Citizen Science and Data Collection. More specifically, students will have an opportunity to access and then analyze, including mapping (working with GHH) the data generated by the expanded air monitoring network and accessed through the air quality dashboard. The air quality dashboard will provide access to near-real time data that will be pulled from the sensors, each of CDAQs FEM monitors, and the AEM analyzer. Historical data will also be accessible through this dashboard.

Section 3: Environmental Justice

The HOLC redlining policy utilized demographic data as well as environmental conditions to determine if a community was desirable and thus eligible for housing loans. The policy would take into account potential exposure to environmental hazards, such as proximity to mobile emission sources and industrial pollution sources, to a grade a community. This practice led to further instances of environmental harm because industry was located in the "undesirable communities" which were ineligible for federal loans[4]. There are approximately 1,400 regulated facilities in the City of Cleveland. Of those, sixteen facilities meet the emissions criteria threshold that require them to have a have a Title V Operating Permit. All of these facilities are located within the Cleveland Crescent or are immediately along the perimeter except for one which is located in the near-West side location. The EPA EJ Screen Tool demonstrates the impact Cleveland's redlining history has today through mobile source exposure and overall rates of PM 2.5. The two indices, Particulate Matter 2.5 and Diesel Particulate Matter, represent exposure to industrial emissions and mobile sources. Cleveland Crescent neighborhoods tend to exceed the 80th to 90th percentile when compared to the nation for both categories.

In addition to increased exposure to air pollution sources, redlined communities did not receive the same investment in the community infrastructure commodities that would reduce the impact of exposure such as tree maintenance and greenspaces (parks). Cleveland has lost approximately 50% of its' tree canopy coverage since 1950. This loss continues and is documented by the 2020 Tree Canopy Progress Report in which some neighborhoods lost up to 14% tree canopy coverage from 2011-2017. The Progress Report has developed a "Purposeful Planting" guideline that analyzes where the need is greatest for reinvesting in the tree canopy based on health data, environmental benefits, and is socio-economic factors. Cleveland Crescent communities are repeatedly identified in the "Purposeful Planting" guide[9]. A reduced tree canopy contributes to the urban heat island effect, which negatively impacts community member's ability to manage health conditions. Increased heat exposure can exacerbate asthma conditions. Many residents may not have access to air conditioning and when traveling outdoors (walking, biking, public transit), they may go extended distances without access to shaded conditions.

Section 4(A): Project Outputs and Outcomes

All of the outputs and outcomes in the CLEANinCLE project are directly related to the EPA Draft FY 2022-2026 Strategic Plan as well as Section 1.C of the RFA. The strategic plan states "EPA will work with air agencies and local communities to prioritize engagement with low-income and marginalized communities that for decades have been overburdened with air pollution and other environmental hazards. EPA will undertake air monitoring and other assessment approaches to address these long-neglected air quality and public health problems." The CLEANinCLE project focuses on redlined communities in the Cleveland Crescent that have the poorest air quality due to systemic racist practices. The outputs and outcomes will take the form of public engagement with marginalized communities, expanded air monitoring networks informed by the community, increased data/access, and public health interventions. Project outcomes and outputs are listed below.

---

[9] Cleveland Tree Coalition. "2020 Progress Report." Accessed from http://www.clevelandtrees.org/cleveland-tree-plan/cleveland-tree-plan-2020-tree-canopy-progress-report/ on 3/23/2022

Outputs

1. City of Cleveland residents will participate in the design of an expanded air monitoring network that is representative of neighborhood level concerns and knowledge. The resultant "bottom-up" network design will collect data on specific areas of concern that have long been ignored or underserved. The specific areas may include proximity to air pollution sources, locations in the community that the resident experiences challenges to their respiratory health, or that currently lacks air monitoring equipment. One spillover impact will be increased participation by the community and better education uptake due to these groups being key stakeholders in this process.
2. The expanded air monitoring network will include thirty (30) sensors, one (1) FEM particulate matter monitor, and one (1) AEM ozone analyzer. The data will all be publically available through an air quality data dashboard that offers near real-time data. The dashboard will also include data from all of CDAQ's continuous particulate matter monitoring sites. The dashboard will be engineered in a format that will allow additional data layers to be added at a later time. Additional data that may be added post-project period include existing air pollution sources, diagnosed health data, and meteorological information.
3. CDAQ will analyze data produced from the air sensor network, FEM particulate matter monitor, and the AEM ozone analyzer to identify neighborhood level air pollution patterns and if specific communities have elevated levels of air pollution. This air quality data analysis will be discussed with the Resident Advisory Committee, reported to residents at Public Forums, and included in quarterly reports.
4. CDAQ will co-locate the sensor with an existing FEM particulate matter monitoring site and on the MMS to evaluate data using the "Excel-based Macro Analysis for Air Sensor Data" tool. If correction factors are required, the information will be communicated to the Resident Advisory Committee, at the Public Forums, and within the quarterly reports.
5. CDAQ will submit quarterly progress reports that includes status updates and all project metrics including but not limited to information on the Public Forums, number of sensors deployed, status of the resident advisory board, and status of SVG narratives. CDAQ will submit a final report to U.S. EPA and will disseminate to the community electronically and in-person.

Outcomes

1. **Air pollution "hot spot maps".** SVG data [10]will be utilized to identify locations of concern and protective factors within neighborhoods. This will be cross referenced with spatially specific mentioned locations to create a map for each neighborhood of poor air quality "hot spots". These maps will be disseminated to community health partners, researchers and neighborhood groups, and guide CDAQ environmental remediation strategies
2. **Spatial coverage metrics:** The spatial scale covered by the existing monitoring units will be calculated prior to project initiation. Subsequently, the change in the spatial scale of the CoC airshed air monitor coverage will be calculated. This will be cross-referenced against social vulnerability measures to develop spatial coverage metrics that will inform further neighborhood level interventions by CDAQ research partners.
3. **Increased utilization of CDAQ services.** Community members will become more aware of CDAQ existing services such as the Air Quality Complaint Hotline, the Citizen Air Monitoring Project (CAMP), requests for Indoor Air Quality/Asthma Home Assessments, and requests for delivery of educational programming. These data will be tracked by neighborhood and submitted in quarterly reports and in the final report.
4. **Improved air quality data access**. The CLEANinCLE project will increase access to air quality data via the real-time dashboard. CDAQ will track general analytics including site visitors, unique users, and time spent on the webpage. CDAQ will seek to increase access throughout the course of the project period.

---

[10]Curtis, A., Felix, C., Mitchell, S. and P. Kerndt (2018) Contextualizing Overdoses in Los Angeles' Skid Row between 2014 and 2016 by Leveraging the Spatial Knowledge of the Marginalized **Annals of the Association of American Geographers** 108 (6), 1521-1536

5. **Improved asthma care in high risk neighborhoods** BHP will create a multi-system continuous quality improvement (CQI) team. Following a standard PDSA (Plan-Do-Study-Act) Cycle the team will seek to improve the care of children with asthma. Key risk factors from the provider surveys will be translated to community stakeholders. Qualitative feedback from community sources will then be translated into key themes. The QI team will work to formulate cross-site goals based off of the mixed-method results. BHP will work in developing a key driver diagram to identify the unique clinical process improvements that need to be made at each site to reach improved outcomes. BHP will be able collect bi-annual clinical data to evaluate the state of the interventions at each site. At the conclusion of the grant period, the process improvements strategies and results will be demonstrated over time and will include what improvements were observed.
6. **Utilization of novel community forum services**. As part of planned community meetings, translator and childcare services will be provided in collaboration with CNP. CDAQ will track how these services are communicated to residents and how often the services are utilized. The CLEANinCLE project will create an after-action analysis to disseminate to other local government agencies. This report will also include an analysis of utilizing community based transcribers to report meeting results to the community at-large.
7. **Sponsored research and publications:** CDAQ will track all instances of the strategies utilized (decreasing barriers to public participation) or the data obtained in the CLEANinCLE project being cited in publications, replicated or utilized to obtain further research funding by CDAQ partners or other community groups

Section 4(B): Performance Measures and Plan

CDAQ is one of four divisions in the Cleveland Department of Public Health (CDPH). CDPH achieved accreditation through the Public Health Accreditation Board (PHAB) in 2019. Per accreditation requirements, CDPH has a Quality Improvement (QI) Plan that includes a Quality Improvement Council.

To ensure continuous improvement of staff performance and that each program is meeting established objectives, CDPH utilizes traditional QI tools such as the PDSA model. Throughout this project period, CDAQ will continually asses the effectiveness of all activities to ensure all project partners are meeting the grant objectives. CDAQ will provide evaluation forms at public meetings to determine effectiveness of the meeting structure and content. All evaluation forms will be reviewed post meeting and recommendations will be incorporated into future planning sessions. At least three evaluations throughout the project period will be requested of the Resident Advisory Committee as well.

To track performance and ensure all deliverables are met, CDAQ will utilize CDPH's Clear Impact Performance Management System. The software utilizes a scorecard to track program and project progress. The scorecard has built in task-tracking tools such as Gantt Charts that can be used to track all aspects of this project proposal. All project deliverables and milestones will be entered into a scorecard for the CLEANinCLE project which will generate Gantt Charts that are identified for each project partner. CDAQ will utilize this tool to set deadlines and internally track status.

Section (4)C: Timeline and Milestone

CDAQ is assuming a performance period of 10/1/2022-9/30/2025. Year one will present with the greatest level of activity. Equipment will be purchased, the dashboard design will begin, and community forums will commence. Once the sensor network is deployed and the dashboard operational, CDAQ expects the activity to be reduced to ongoing and regular activities. The ongoing activities will include Neighborhood Forums and Virtual sessions, SVG interviews, and medical provider surveys. DAQ expects there to be pre-award activities that will include 1) City Council accepting the funding award 2) Designing the Resident Advisory Committee application and 3) scheduling the first three public forums. These activities will be completed as in-kind activities. The post-award activities will include submitting a final report within 120-days of the project period closing. Key Activities by quarter are listed in the table below.

Quarter One	Quarter Two	Quarter Three	Quarter Four
• Release application for Resident Advisory Committee and Select Advisors • Release Public Bid for the MMS • Release Public Bid for the Sensors • Complete Baseline Provider Survey • Train CDPH Staff on conducting SVG	• Select Resident Advisor/Complete Kick-Off meeting • Receive and Review bid for MMS • Receive Bid and Issue PO for Sensors • Analyze Medical Provider Results • Complete 2 SVG Interviews • Begin Engineering Dashboard	• Request Council Approval for MMS • Provision Sensors for Deployment • Complete bi-annual medical provider survey • Complete 3 SVG Interviews • Release air quality dashboard prototype to residents	• Issue PO for MMS • Begin Sensor Deployment • Complete 3 SVG Interviews • Update dashboard and publish

Section 5: Quality Assurance and Quality Control Statement Submitted Separately per RFA instructions

Section 6: Programmatic Capability and Past Performances

Founded in 1882, CDAQ has a long history of regulating air quality in the City of Cleveland. CDAQ has a staff of approximately 40 professionals trained in Engineering, Environmental Science, Biology, Chemistry and related fields. CDAQ staff are trained in the technical aspects of this proposal (monitoring equipment and practices, air pollution regulation, air pollution permitting, and quality assurance) as well as effective community engagement (government-public relationship building, partner cultivation, educational content development, marketing). CDAQ also manages an indoor air quality program that has the capacity to conduct in-home assessments. The resume of key personnel that will be involved in the CLEANinCLE project are attached. CDAQ maintains a variety of grants that are listed below. CDAQ is in good standing and has met all deliverables and reporting requirements of all awarded grants in the past three years.

1) Ohio EPA – Division of Air Pollution Control (Grant): CDAQ is the Local Air Agency (LAA) for Cuyahoga County. CDAQ carries out all key aspects, monitoring, enforcement, and permitting, of the air quality program. CDAQ has been the LAA since 1972. CDAQ is in good standing with Ohio EPA, and fulfills all reporting requirements of the EPA grant.
2) Department of Homeland Security (DHS) – BioWatch (Cooperative Agreement): CDAQ has been the awardee of BioWatch funding since the projects inception in 2002. CDAQ is in good standing with DHS, and fulfills all reporting requirement of the cooperative agreement.
3) Ohio Department of Health (ODH) – Burke Lakefront Radiation Sampling (Grant): CDAQ performs weekly filter collection of radiation samples for ODH. CDAQ has carried out collection activities for over 18 years. CDAQ is in good standing with ODH, and fulfills all reporting requirements of the grant.
4) National Science Foundation (NSF) – US Ignite Sponsored Project, Air Quality Improvements to Mitigate COVID-19 Deaths Cleveland, Ohio. CDAQ was a partner in this grant to install 50 low cost PM2.5 air quality sensors throughout Cuyahoga County. CDAQ collocated the sensors with two EPA continuous FEM monitors to study the accuracy of the sensor data. CDAQ developed siting criteria and siting checklist to be used when siting the sensors. All reporting requirements of the grant were met. ISSACS, a project partner on this application, was the Primary Investigator of that award.

Section 7: Budget

The CLEANinCLE project is requesting $500,000 and expects to provide $221,358 of in-kind support through Cleveland Division of Air Quality personnel and use of surplus AEM ozone analyzer equipment. The equipment that will be purchased includes: $125,000 for the MMS and approximately $36,000 for the sensors. CNP will receive administrative fees to manage the resident advisory committee and will administer Participant Support Cost. Their budget also includes public forum expenses. CWRU will be a sub-awardee with financial support for

two separate Departments: $63,211 (PQHS) and $99,698 (ISSACS). The ISSACs budget includes $1,500 for supplies and $1,500 for a monthly storage charge for hosting the dashboard for 30-months. BHP will receive $24,000 for coordination of medical providers and data analysis. Ohio EPA and the CCF-RI are not requesting any financial support for their roles. Approximately 60% of the budget will be requested in year one to purchase equipment, supplies, and begin engineering the dashboard. Once sensors are deployed and the dashboard has been developed, personnel time will be reduced. The funding in years 2 and 3 will support CDAQ staff, geospatial and SVG support, the resident advisory committee, public forums, and medical provider engagement.

Budget Table				
	Item Description	**Additional Item Information**	**EPA Grant**	**Voluntary Cost Share**
Personnel	Commissioner	1 hour per week @ 46.39 x 156	$ -	$ 7,236.00
	Chief of Outreach/Project Manager	20 hours per week year 1; 16 hours per week years 2 & 3 @ $33.83/hour	$ 21,039.00	$ 70,436.00
	Chief of Monitoring	4 hours per week @ $33.83/ hr x 156 (plus 15 hours in year 1)	$ 10,808.00	$ 10,808.00
	Data Validation and Quality Control Manager	5 hours per week @ $25.65 /hr x 156 (plus 15 hours in year 1)	$ 15,293.00	$ 5,097.00
	Instrument Technician	1.25 Hours per week @ $25.10/hr x 156 (plus 125 hours year 1)	$ 2,008.00	$ 6,024.00
	Monitoring Specialist	4 hours per week @ $21.32/hr x 156 weeks (plus 85 hours year 1)	$ 3,778.00	$ 11,336.00
	Health Outreach Specialist	16 hours per week year 1; 12 hours per week year 2 and 3 @ $21.43/hour	$ 8,781.00	$ 35,793.00
		Total Personnel	**$ 61,707.00**	**$ 146,730.00**
Fringe	Commissioner	Fringe Rate: 29% of salary	$ -	$ 699.00
	Chief of Outreach/Project Manager	Fringe Rate: 32% of salary	$ 6,732.00	$ 22,536.00
	Chief of Monitoring	Fringe Rate: 32% of salary	$ 3,458.00	$ 3,458.00
	Field Monitoring Manager	Fringe Rate: 36% of salary	$ 5,505.00	$ 1,835.00
	Instrument Technician	Fringe Rate: 28% of salary	$ 562.00	$ 1,686.00
	Health Outreach Specialist	Fringe Rate: 29% of salary	$ 2,511.00	$ 10,414.00
		Total Fringe	**$ 18,768.00**	**$ 40,628.00**
Equipment	Trailer Mounted Monitoring Shelter		$ 71,141.00	$ -
	Continuous PM2.5 and PM10 FEM Instrumentation		$ 42,000.00	$ -
	Meteorological Instruments		$ 5,000.00	$ -
	AEM ozone analyzer	Surplus equipment on hand		$ 12,500.00
	Data Logger	Surplus equipment on hand		$ 8,000.00
	Ozone Calibrator	Surplus equipment on hand		$ 13,500.00
		Total Equipment	**$ 118,141.00**	**$ 34,000.00**
Supplies	LoRaWAN PM2.5 and PM 2.5 Sensors	30 @ $1,200 each	$ 36,000.00	$ -
	Shelter Temperature Sensor		$ 400.00	$ -
	DFU Filters for Continuous PM2.5 and PM10 FEM Instrument	$40/unit x 2/instruments x 4/year x 2/year	$ 640.00	$ -
	Logbooks for MMS	Documents monitoring activities for the Site, Ozone Analyzer, Ozone Calibrator and T640X; 4 @ $60 each	$ 240.00	$ -
	Electrical Site Hookup	Breaker Box, Breakers, Flex Conduit, Wiring	$ 800.00	$ -
	3.6V AA Lithium Batter	$5/battery x 4 batters/sensor x 30 sensors x 3 changes per project period	$ 1,800.00	$ -
		Total Supplies	**$ 39,880.00**	**$ -**
Other	Electrical for MMS	Electricity to operate equipment; $40 per month for 24 months	$ 960.00	$ -
	Wi-Fi for MMS	Modem and monthly service	$ 1,000.00	$ -
	Participant Support Cost	Resident Advisory Committee. 6 advisors at $1,200 per year x 3 years	$ 21,600.00	$ -
	Subawardees	BHP ($24,000); CNP ($51,035); and CWRU ($162,909)	$ 237,944.00	$ -
		Other Total	**$ 261,504.00**	**$ -**
		Total	**$ 500,000.00**	**$ 221,358.00**

Nicholas A. Barendt | Office: 216-368-1809 | nab2@case.edu

Education History
Case Western Reserve University, M.S., Electrical Engineering and Applied Physics, 1998
Case Western Reserve University, B.S., Electrical Engineering and Applied Physics, 1995

Work and Research Experience
Executive Director, Institute for Smart, Secure and Connected Systems, Case Western Reserve University, Cleveland, Ohio: 2018-Present (Awarded > $7M in Capacity Funding)

Co-Executive Director, Internet of Things Collaborative (IOTC), Cleveland, Ohio: 2018-Present

Adjunct Senior Instructor, Department of Electrical, Computer, and Systems Engineering
Case Western Reserve University, Cleveland, Ohio : 2014-Present

Vice President, LeanDog, Inc. Cleveland, Ohio: 2016
Director of Studio, LeanDog, Inc. Cleveland, Ohio: 2013-2016

Leadership Experience
Founding Curator of the Cleveland Hub, World Economic Forum Global Shapers Community, Cleveland, Ohio 2013-2014

Treasurer, Case Alumni Association, Cleveland, Ohio, 2017-2019
Assistant Treasurer, Case Alumni Association, Cleveland, Ohio, 2015-2017

Director, Board of LAN eXtensions for Instrumentation (LXI) Consortium, 2007-2010

Honors, Awards, and Patents
Senior Member of the IEEE

Viscous Material Non-contact Jetting System
US 8257779, September 4, 2012 (Nordson Corporation, Westlake, Ohio)
Viscous Material Non-contact Jetting System
US 7939125, March 03, 2011 (Nordson Corporation, Westlake, Ohio)

Publications (Selected)
McConnell, M., Loparo, K., Barendt, N., "An Introductory Course on the Design of IoT Edge Computing Devices," *ASEE annual conference and exposition*. 2021.

Nguyen P., Barendt, N., *et al.*, "A Scalable Pavement Sensing, Data Analytics, and Visualization Platform for Lean Governance in Smart Communities," *2020 MERCon*, 2020.

Barendt, N., Sridhar, N., Loparo. K. "A new course for teaching internet of things: a practical, hands-on, and systems-level approach." *ASEE annual conference and exposition*. 2018.

Correll, K., Barendt, N, Branicky, M. "Design considerations for software only implementations of the IEEE 1588 precision time protocol." *Conf. on IEEE*. Vol. 1588. 2005.

Newman, Wyatt S., et al. "Design lessons for building agile manufacturing systems." *IEEE Transactions on Robotics and Automation* 16.3 (2000): 228-238.

DIVYA SRIDHAR, LEED AP, M. ARCH

Ex. 6 Personal Privacy (PP)

SUMMARY

- LEED Accredited Professional and Master of Architecture with success in zero-waste process redesign, green building, permaculture design and advocacy and placemaking initiatives
- Community thought leader, organizer, and volunteer dedicated to creating livable, healthy, and vibrant communities through well-designed food systems, environmentally-friendly building and design, and sustainable living solutions supported by city and community policies
- Experienced workshop and charrette facilitator for community-engaged planning.

PROFESSIONAL AND COMMUNITY EXPERIENCE

CLEVELAND NEIGHBORHOOD PROGRESS, Cleveland, OH — 1/2019 – Present

A local nonprofit community development funding intermediary invested in revitalization of Cleveland's neighborhoods.

Manager of Climate resiliency and Sustainability

- Developing and managing several grant funded projects and programs: RFP development, contract management, reporting
- Active participation on several task forces and working groups
- Critical thinking and analytical skills for systems-based approach
- Strategic at identifying synergies and interdisciplinary collaborations, both internally and externally

GREEN TRIANGLE, Cleveland, OH — 10/2008 – Present

A 501(c)(3) advancing education and creation of permaculture principles for land stewardship through projects, workshops and designs

Sustainability and Land Use Consultant

- Collaborated with City of Cleveland planners, council, and lawyers to pass ordinance for surface painting on city streets
- Co-facilitated the art and urban design pilot program, City-Repair, a community-driven project of Neighborhood Connections to introduce art, sustainability and design processes to stakeholders in 3 target neighborhoods
- Co-conducted workshop series on permaculture design and design for natural construction
- Designed curriculum structure and provided logistics support for the Permaculture Design Certification process

CLEVELAND THYAGARAJA ARADHANA INDIAN MUSIC FESTIVAL, Cleveland, OH — 04/2007 – Present

An annual, 12-day music festival in association with Cleveland State University

Volunteer Zero Waste Coordinator

- Introduced recycling and composting to the twelve day music event
- Converted nearly eight tons of waste to compost for three community gardens and local food farm
- Introduced an innovative waste-to-food loop, working with a vermiculture team
- Streamlined food service activity at festival to work toward zero waste by leveraging community gardens

CITY FRESH, Cleveland, OH — 04/2009 – 03/2010

Volunteer and Produce Coordinator

- Co-ordinated volunteers and logistics for supply, delivery and produce stops
- Increased community availability and impact by working with low income and senior food voucher program
- Served as representative to Cleveland Cuyahoga Food Policy Coalition, 10/2008 – 04/2010
  - Conducted outreach to small community groups about Health and Nutrition Policy activities
  - Worked in market and food access calendar released in CCFPC in 2010

MBI/K2M ARCHITECTURE SERVICES, Cleveland, OH — 07/2007 – 01/2008

Architectural Intern

- Worked on the initial conceptualizing team to design a new LEED Silver office space
- Researched alternate materials and arranged guest speakers on alternate and green design concepts

GREATER CLEVELAND GREEN BUILDING COALITION, Cleveland, OH

Volunteer Project Co-Coordinator — 01/2008 – 04/2008

- Helped conceive and initiate an Existing Building Renovation Workshop
- Achieved LEED Silver Designed curriculum and coordinated 2 workshops

Ex. 6 Personal Privacy (PP)

Emerging Green Builder Intern 2006

- Designed a prototype green-and-accessible house for Habitat for Humanity's affordable housing program on Bridge Avenue
- Co-worked on updating and revamping the green building resource guide for Greater Cleveland

DAKSHINACHITRA (MUSEUM OF VERNACULAR ARCHITECTURE), Chennai, India 04/2003 – 07/2003

Volunteer Workshop Coordinator

- Designed and organized two construction workshops for architecture
- Led workshops on vernacular construction for college architecture students, to emphasize hands-on-learning at undergraduate level

EDIFICE ARCHITECT AND INTERIOR DESIGNERS, Chennai, India 06/2002 – 11/2002

Design Intern

- Prepared planning documents, analyzed and conceived designs for residences
- Analyzed and designed offices including pricing estimates for software comapanies.

CIVIC LEADERSHIP AND ENGAGEMENT

- Board of Directors, Green Triangle, A permaculture design and education group, Cleveland, OH, 2009 – Present
- Strategic Planning Team, Mt. Pleasant Green Corps, Cleveland, OH, 2013– 2014
- Advisory Committee, East Cleveland-Doan Brook Permaculture Easement, Cleveland, OH, 2013 – 2014
  - Team chartered by the City of Cleveland to discuss and preserve the first permaculture easement in the Cleveland area
- Host Committee, American Community Garden Association, Cleveland, OH, 2015 – 2016
- Strategic Planning Committee, Gordon Square Farmers' Market Strategic Planning Committee, Cleveland, OH, 2014 – 2016
- Zero Waste Core Team Member, Entrepreneurs for Sustainability, Cleveland, OH 2008 - 2010
- Leader, Advocate, Volunteer, Food Systems Collaborative Group, Cleveland, OH, 2007 – 2010
  - Established community garden in the Hough community, Cleveland, including presentation to the councilman
  - Designed programming for Neighborhood Leadership Institute in 2009 to investigate a food-based local economy in an identified area
- Volunteer, Association for India's Development (AID India), 06/2004 – 04/2010
  - Tsunami Rehabilitation Committee, Designed and established rehabilitation sites for tsunami-affected Southern India, 2005 – 2006
- Volunteer, Asha for Education, Cleveland Chapter, Cleveland, OH, 01/2005 – 04/2010
- Volunteer, United Cerebral Palsy, Cleveland, OH, 09/2004 – 12/2004
- Volunteer, Association for India's Development, (AID India) India, 01/2003 – 06/2004

EDUCATION

KENT STATE UNIVERSITY, Kent, OH

Master of Architecture, 2006

- Research: Tracing the Economic Value and Use of Flexible Spaces in Urban Design to Empower Women

MADRAS UNIVERSITY, Chennai, India

Bachelor of Architecture, 2003

- Thesis: Use of Natural Light in Design – Design of Contemporary Arts and Science Museum

CERTIFICATIONS

- **Permaculture Certified Designer,** Permaculture Design Institute, October 2012
- **LEED Accredited Professional in New Construction and Major Renovation**, U.S Green Building Coalition 2009
- **Graduate**, Neighborhood Leadership Institute, Summer 2009

TECHNICAL SKILLS

- Design Drawings
- Adobe Photoshop
- Microsoft Office Suite

LIZ SVOBODA, MPH

Akron, Ohio Ex. 6 Personal Privacy (PP)
Ex. 6 Personal Privacy (PP)

EDUCATION

AUGUST 2015
MASTER OF PUBLIC HEALTH, KENT STATE UNIVERSITY
Healthy Policy & Management
Practicum: Access to Care: Barriers for Low-Income Households

MAY 2009
BACHELOR OF ARTS, OHIO WESLEYAN UNIVERSITY
Psychology, French

EXPERIENCE

2020 – PRESENT
CHIEF EPIDEMIOLOGIST, CLEVELAND DEPT. OF PUBLIC HEALTH/CDC FOUNDATION

- Lead a team of 18 people including epidemiologists, disease surveillance specialists, and student interns
- Develop data collection processes and identify external data sources
- Use statistical methods to identify elevated health risks to residents
- Create data products to clearly communicate health information to the community
- Present health data to internal and external stakeholders such as the Office of the Mayor, Cleveland City Council, and various community groups
- Initiated the first strategic planning process specific to the Office Epidemiology and Population Health

2018 – 2019
STATEWIDE OPIOID COORDINATOR, OHIO ASSOC. OF COUNTY BEHAVIORAL HEALTH AUTHORITIES

- Provide information on substance use disorder to all Ohio alcohol, drug, and mental health authorities
- Develop collection tools to gather data on the usage of withdrawal centers and state psychiatric hospitals
- Present behavioral health information and resources at events across Ohio
- Support the planning and management of 2 annual statewide conferences

2014 – 2015
DATA CONSULTANT, MEDINA COUNTY HEALTH DEPARTMENT

- Develop surveys to collect information from county employees about the effectiveness of local services
- Conduct focus groups with residents on the accessibility of medical, behavioral, and social services
- Use data to make recommendations for improvement of services
- Present information to funders

2013 – 2014

QUALITY OF LIFE RESEARCH INTERN, SUMMIT COUNTY PUBLIC HEALTH

- Research and compile data on the effectiveness of single parenthood on quality of life
- Interview leaders of local service agencies about the challenges faced by their clients
- Create a report of findings and present to funders
- Assist with data management across departments

2012 – 2014

COMMUNITY RELATIONS COORDINATOR, ACCESS WOMEN'S SHELTER

- Present information about the shelters mission and needs at community events
- Identify potential donors and funding sources
- Assist with grant application and management
- Coordinator all in-kind donations from companies and individuals
- Create volunteer opportunities and manage all on-site volunteers

SKILLS

- ArcGIS
- Power BI
- SAS
- R
- InDesign
- Microsoft Office Suite
- Data Analysis & Management
- Public Health Surveillance
- Research
- Strategic Planning
- Risk Communication

PRESENTATIONS

BUILDING PUBLIC HEALTH PARTNERSHIPS: COVID-19 RESPONSE, STRATEGIC MANAGEMENT AND COMMUNITY ENGAGEMENT IN CLEVELAND, OHIO

AMERICAN PUBLIC HEALTH ASSOCIATION ANNUAL MEETING, DENVER, CO. 2021

CLEVELAND COVID-19 DASHBOARD: DYNAMIC SUMMARY OF DISEASE RISK ACROSS A DIVERSE INNER-CITY POPULATION

AMERICAN PUBLIC HEALTH ASSOCIATION ANNUAL MEETING, DENVER, CO. 2021

David G. Hearne, Commissioner
Cleveland Division of Air Quality; 75 Erieview Plaza, Suite 200; Cleveland, OH 44114
216-664-2297
dhearne@clevelandohio.gov
www.clevelandhealth.org

David Hearne is an accomplished public health administrator with demonstrated expertise implementing air quality policies. In September 2020, Mr. Hearne was sworn-in as the Commissioner of the Cleveland Division of Air Quality having served as the Interim Commissioner since 2016. In this capacity, he oversees all management, planning, and operations for this local air agency, a delegated representative of Ohio EPA in the heavily industrialized Cuyahoga County, Ohio. He also interacts with grantor agencies including US EPA, Ohio EPA, Department of Homeland Security, and Ohio Department of Health.

Mr. Hearne has more than 35 years of air pollution regulatory and policy implementation experience from the U.S. EPA consulting sector and state and local public health sector. He previously served for 16 years as the Chief of Engineering in the Division of Air Quality overseeing air pollution permitting and compliance for more than 6,500 facilities. Mr. Hearne also serves in an important role as an Operations Section Chief on the Cleveland Department of Public Health emergency response team. Earlier in his career, while serving as an environmental consultant to US EPA, he provided recognized expertise on the development of air quality regulations including National Emissions Standards for Hazardous Air Pollutants and New Source Performance Standards. He also managed the preparation of Control Techniques Guidelines documents and regulatory support documents.

Mr. Hearne is a member of the National Association of Clean Air Agencies and the Ohio Local Air Pollution Control Officers Association. He has served as the chairperson on the Air Quality Subcommittee with the Northeast Ohio Area-wide Coordinating Agency. He holds a B.S. in Biology from Randolph-Macon College in Ashland, Virginia, and a M.S. in Environmental Biology from George Mason University in Fairfax, Virginia. In 2010, he completed the Cleveland Management Academy curriculum at Cleveland State University - Levin College of Urban Affairs.

Bryan Sokolowski, Chief of Monitoring
Cleveland Division of Air Quality
75 Erieview Plaza, Suite 119
Cleveland, Ohio, 44114
(216) 420-7663
bsokolowski@clevelandohio.gov

Bryan Sokolowski has 14 years of air quality experience. Mr. Sokolowski became the Chief of Monitoring in May 2018. In this capacity, he manages the ambient air quality monitoring network for Cuyahoga County, as well as manages various other air quality monitoring grants. The ambient air quality monitoring network comprises approximately 60 instruments that monitor air quality and collect meteorological data. CDAQ operates one of 40 Photochemical Assessment Monitoring Station (PAMS) network sites across the United States. The PAMS site utilizes an Auto Gas Chromatograph, True NO2, carbonyl sampler, and ceilometer to collect ozone precursor data.

Mr. Sokolowski is part of a group that was awarded funding to install fifty (50) low cost Particulate Matter (PM) 2.5 sensors around Cuyahoga County to study the possible link between COVID-19 deaths and PM2.5 exposure. Mr. Sokolowski was responsible for determining a plan for deployment of the sensors, for developing criteria for sensor siting, development of a sensor siting checklist, collocation of the sensor to a Federal Equivalency Monitor for comparison, and assisting with reviewing collocation data.

Prior to working in the air monitoring section, Mr. Sokolowski served in the roles of an Environmental Enforcement Specialist and then a Field Enforcement Manager. Within these former roles, he was responsible for inspection and enforcement of permitted industrial facilities, and investigation of air complaints.

Mr. Sokolowski is a member of the National Association of Clean Air Agencies, the Ohio Local Air Pollution Control Officers Association, and serves on the Air Quality Subcommittee with the Northeast Ohio Area-wide Coordinating Agency. He holds a Bachelors of Science in Biology from Cleveland State University.

Updated: 2022-03-18 **Christopher A. Mundorf**

Ex. 6 Personal Privacy (PP)

Employment

Better Health Partnership, Director of Data Analytics & Reporting	2019-present
Portage County Health District, Epidemiologist	2018-2019
Hiram College, Assistant Professor of Community and Public Health	2016-2019
Tulane University School of Public Health and Tropical Medicine, Adjunct Faculty	2016- 2018
Tulane University School of Public Health and Tropical Medicine, Postdoctoral Research Fellow	2015-2016

Education/Training

Tulane University, Postdoctoral Research Fellowship, Public Health	2015
Tulane University, Ph.D. Public Health	2015
Tulane University, MPH Public Health, Environmental Health Science	2012
The Ohio State University, B.A. Political Science	2007

Publications

Mundorf, C., Shankar, A., Moran, T., Heller, S., Hassan, A., Harville, E., & Lichtveld, M. (2017). Reducing the Risk of Postpartum Depression in a Low-Income Community Through a Community Health Worker Intervention. *Maternal and Child Health Journal*, 1-9. doi: 10.1007/s10995-017-2419-4

Mundorf, C., Wilson, M., Shankar, A., Wickliffe, J., & Lichtveld, M. (2017). Cultural influences on the management of environmental health risks among low-income pregnant women, Health, Risk & Society, 19(7-8), 369-386, doi: 10.1080/13698575.2017.1398819.

Mundorf, C., Shankar, A., Peng, T., Hassan, A., & Lichtveld, M. Y. (2017). Therapeutic Relationship and Study Adherence in a Community Health Worker-Led Intervention. *Journal of Community Health, 42*(1), 21-29. doi: 10.1007/s10900-016-0220-8

Mundorf, C. (co-author) (2017). Energy Production and Associated Policies. In B. L. Johnson & M. Y. Lichtveld (Eds.), *Environmental Policy and Public Health* (2nd ed., pp. 367-380). Boca Raton, FL: CRC Press.

Mundorf, C. (co-author) (2017). The Built Environment. In B. L. Johnson & M. Y. Lichtveld (Eds.), *Environmental Policy and Public Health* (2nd ed., pp. 417-430). Boca Raton, FL: CRC Press.

Mundorf, C., and Maureen Y. Lichtveld. (2016). Using community-based, ethnographic methods to examine risk perceptions and actions of low-income, first-time mothers in a post-spill environment. *Journal of Risk Research*, 1-15. doi: 10.1080/13669877.2016.1200656

Lichtveld, M. Y., Shankar, A., **Mundorf, C**., Hassan, A., & Drury, S. (2016). Measuring the Developing Therapeutic Relationship Between Pregnant Women and Community Health Workers Over the Course of the Pregnancy in a Study Intervention. *Journal of Community Health, 41*(6), 1167-1176. doi: 10.1007/s10900-016-0198-2

Lichtveld, M., Sherchan, S., Gam, K. B., Kwok, R. K., **Mundorf, C.**, Shankar, A., & Soares, L. (2016). The Deepwater Horizon Oil Spill Through the Lens of Human Health and the Ecosystem. *Current Environmental Health Reports*, 1-9. doi: 10.1007/s40572-016-0119-7

Lichtveld, M., Goldstein, B., Grattan, L., & **Mundorf, C.** (2016). Then and now: lessons learned from community- academic partnerships in environmental health research. *Environmental Health, 15*(1), 117. doi: 10.1186/s12940-016-0201-5

Manifest for Grant Application # GRANT13580119

Grant Application XML file (total 1):

1. GrantApplication.xml. (size 37473 bytes)

Forms Included in Zip File(total 6):

1. Form ProjectNarrativeAttachments_1_2-V1.2.pdf (size 16023 bytes)

2. Form SF424_3_0-V3.0.pdf (size 24170 bytes)

3. Form SF424A-V1.0.pdf (size 23147 bytes)

4. Form EPA4700_4_3_0-V3.0.pdf (size 25255 bytes)

5. Form OtherNarrativeAttachments_1_2-V1.2.pdf (size 16007 bytes)

6. Form EPA_KeyContacts_2_0-V2.0.pdf (size 37346 bytes)

Attachments Included in Zip File (total 17):

1. ProjectNarrativeAttachments_1_2 ProjectNarrativeAttachments_1_2-Attachments-1234-CLEANinCLE_final_3.25.22.pdf application/pdf (size 1024672 bytes)

2. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1239-Letter of Committment Case Western Reserve University.pdf application/pdf (size 115047 bytes)

3. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1240-Liz_Svoboda_Resume.pdf application/pdf (size 158477 bytes)

4. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1237-Letter of Committment Better Health Partnership.pdf application/pdf (size 489897 bytes)

5. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1238-Letter of Committment Cleveland Clinic.pdf application/pdf (size 128964 bytes)

6. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1236-Letter of Committment Cleveland Neighborhood Progress.pdf application/pdf (size 468471 bytes)

7. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1235-Quality Assurance and Quality Control Statement.pdf application/pdf (size 434346 bytes)

8. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1249-David R Salem CV.pdf application/pdf (size 431521 bytes)

9. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1248-Commisioner Hearne Resume _2022.pdf application/pdf (size 8601 bytes)

10. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1247-Christina Yoka_Project Manager and Chief of Outreach.pdf application/pdf (size 442148 bytes)

11. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1246-Letter of Committment Ohio EPA.pdf application/pdf (size 648556 bytes)

12. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1245-Bryan Sokolowski CV.pdf application/pdf (size 439749 bytes)

13. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1250-Macmurdo_Biosketch.pdf application/pdf (size 145210 bytes)

14. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1243-Barendt 1-page Resume(1).pdf application/pdf (size 119971 bytes)

15. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1244-CurtisNSFbiosketch_0321_2page.pdf application/pdf (size 131057 bytes)

16. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1241-Mundorf_CV 2page 2022.03.18 .pdf application/pdf (size 154050 bytes)

17. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1242-Sridhar.Divya_Resume.pdf application/pdf (size 107779 bytes)

David R. Salem
Cleveland Department of Public Health
75 Erieview Plaza
Cleveland, Ohio 44114
216-664-7447
dsalem@clevelandohio.gov

Professional Summary

Dedicated environmental professional with 7+ years experience as Monitoring Field Manager/Quality Assurance Coordinator for the City of Cleveland Division of Air Quality (CDAQ). Supervise a team of Environmental Monitoring Specialists to ensure the maintenance and collection of data from Ohio EPA ambient air monitoring equipment located throughout Cuyahoga County is compliant with required USEPA protocols. Assess and justify ambient air data generated meets established regulatory requirements.

Professional Experience

Field Manager/Quality Control Coordinator
City of Cleveland Department of Public Health, Division of Air Quality, Monitoring Section

- Oversight of ambient air monitoring data collection
- Developed and maintained quality control documentation
- Ensuring compliance with and development of standard operating procedures
- Maintenance of quality control transfer standard certifications
- Evaluation and certification of all collected pollutant data
- Report monthly data reviews to OEPA

Environmental Monitoring Specialist (CDAQ)

- Managed the operation of ambient air monitoring sampling equipment
- Performed equipment performance evaluations and calibrations
- Maintenance of assigned air sampling instruments

Education

Post graduate A.D. certificate, Environment Health and Safety Technology, Cuyahoga County Community College

M.S. Urban Studies/Environmental Assessment – Cleveland State University.
Exit project: Phytoremediation: A Possible Alternative Route a Cleaner, Greener Environment

B.S. Geology, Kent State University

Skills

- Collaboration and teamwork
- Critical thinking
- Problem solving
- Written communication
- Professionalism and strong work ethic